DESIGN REPORT
FOR THE
THIN BARRIER CURTAIN WALL
AND THE TILL WATER PUMP TESTING

Enviro-Chem Corporation Superfund Site
Zionsville, Indiana

Prepared for

Enviro-Chem Corporation Trust

Submitted to

United States Environmental Protection Agency, Region 5
and
Indiana Department of Environmental Management

Submitted by

ENVIRON International Corporation
Deerfield, Illinois

September 2005

ENVIRON

September 22, 2005

Mr. Matthew Ohl
United States Environmental Protection Agency
77 West Jackson Boulevard (HSRW-6J)
Chicago, IL 60604-3590

RE: Design Report
Enviro-Chem Superfund Site, Zionsville, Indiana

Dear Mr. Ohl:

Enclosed, please find the Design Report for the Installation of the Thin Barrier Curtain Wall (TBCW) and the Till Water Pump Testing. As stated during our September 22, 2005 telephone conversation, the proposed Contractor has a limited window of availability prior to the completion of this year's construction season. We very much appreciate your schedule for providing comments on the attached document, as stated in your September 22, 2005 email. The Trustees look forward to receiving your comments on October 4, 2005 and discussing these comments during our October 6, 2005 telephone conference.

If you have any questions or comments regarding the enclosed document, please do not hesitate to give me a call.

Sincerely,

ENVIRON International Corporation

Scott Hayter, P.G.
Manager

Enclosure

SCH:rms

cc: Thomas Krueger, Esq. – USEPA
Mr. Bruce Hamilton – IDEM
Ms. Sarah Finley – IDEM
Mr. Kevin Johnson – IDEM
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1.0 INTRODUCTION

1.1 Introduction

This Design Report for the Thin Barrier Curtain Wall (TBCW) and for till water pump testing has been prepared for the Enviro-Chem Corporation Superfund Site ("ECC" or the "Site"), located in Zionsville, Indiana. It is submitted by ENVIRON International Corporation (ENVIRON) on behalf of the Enviro-Chem Corporation Trust (the "Trust").

1.2 Background

As presently configured, the Soil Vapor Extraction (SVE) system that has been installed at the Site has not achieved the subsurface water cleanup standards in the till set forth in Table 3-1 to Revised Exhibit A. The United States Environmental Protection Agency (USEPA) and Indiana Department of Environmental Management (IDEM) are concerned that failure to achieve those cleanup standards may, over time, have an adverse effect on water quality in Unnamed Ditch, which is located adjacent to the eastern portion of the Site. For that reason, the Consent Decree and the amended Record of Decision (ROD)[1] provide for specific Additional Work to be performed if USEPA determines that those standards were not met within a 5-year period, unless the parties agree otherwise.

These standards were not met within the 5-year period provided in the Consent Decree, and the agreed modifications to the "Additional Work" provisions of the Consent Decree were presented in Attachment Z-1, dated June 2005 (Attachment Z-1). As proposed in Attachment Z-1, the existing SVE system will be augmented by installation of additional SVE trenches and a TBCW generally along the alignment previously required in Revised Exhibit A to the Consent Decree.

1.3 Objectives

The primary objectives of the TBCW are to: (1) cut off a potential source of contamination to the Unnamed Ditch; and (2) eliminate, *inter alias*, any connection between sand lenses in the till unit and Unnamed Ditch, thus significantly decreasing the potential volume of water to be removed and treated by the augmented SVE system, particularly from the former Southern Concrete Pad Area. Therefore, it is necessary to install the TBCW prior to conducting the till water pump testing referenced below. Additionally, the TBCW performs the same function as the trench liner provided for in the existing Additional Work provision of Revised Exhibit A. Accordingly, the TBCW is consistent with the design intention of both revised Exhibit A and the proposed Attachment Z-1.

[1] The original ROD for the Site was issued in September 1987, and the Amended ROD was issued in June 1991.

The primary objectives of the till water pump testing are to: (1) determine whether dewatering of the augmented SVE system, particularly trench segments 5 and 6, is feasible;[2] and (2) obtain data necessary to complete the design of the augmented SVE system. The design and feasibility of the augmented SVE system is, in part, dependent on the volume of water to be extracted from the augmented SVE trenches. Initial and maintenance dewatering will be required at the trenches; however, we do not anticipate any significant dewatering issues at the northern portion of the Site where previous SVE operations have occurred. The concern, with regard to trench dewatering, is focused on the proposed trenches that will be installed around the periphery of the former Southern Concrete Pad Area. The augmented SVE trenches, along with a permeable reactive gate system (PRGS), will also be used for control of the Site hydraulic gradient within the till unit following SVE activities. Till water pump test data will be used to estimate initial and maintenance dewatering rates, and maximum expected flow rates to the completed PRGS.

Following the review of the till water pump test data, the Trustees will confirm that dewatering is not an issue for SVE operations at the northern portion of the Site where previous SVE operations have occurred and will evaluate dewatering at the southern portion of the Site, around the periphery of the former Southern Concrete Pad Area. If the test data indicate that dewatering is not feasible at one or more of the augmented SVE trenches in that area, the Trustees will present remedial options for those trenches in the design report for the augmented SVE system.

[2] Augmented SVE trench segments 5 and 6, as presently proposed in Attachment Z-1, are to be located at the southern end of the Site in the area of the Former Southern Concrete Pad Area.

2.0 SITE PREPARATION AND SITE CONTROLS

2.1 Site Preparation

The fence along the eastern Site boundary will be disassembled and stored on-site. The removal of the fence is necessary to allow access to this area for the installation of the TBCW. This fence will be re-installed following the completion of the TBCW installation activities. Limited removal of vegetation between the fence and Unnamed Ditch may also be needed. The existing Site fence and the location of Unnamed Ditch are shown on Drawing C-1.

A gravel platform will be installed along the eastern Site boundary and will serve as a working platform for the TBCW installation equipment. This platform will create a level and stable surface for the installation of the TBCW. The location of the platform is shown on Drawing C-1, and the specifications for this platform are contained in Appendix A. Some limited excavation will be allowed to grade the area for the working platform; however, any portions of the existing cap, including geomembrane, geotextile, and geonet materials that are disturbed by the Contractor must be replaced.

The Contractor will establish an on-site Support Zone for "clean" operations. The location of the Support Zone is shown on Drawing C-1. The Support Zone will contain temporary Site facilities, including an office trailer, toilet facilities, vehicle parking areas, utility hookups, decontamination pad, and a staging area for potentially contaminated materials (in containers). The office trailer, utility hookups, vehicle parking areas, and a decontamination pad currently exist at the Site. Locations for certain Support Zone facilities are depicted on Drawing C-1.

2.2 Site Access Restrictions

Access restrictions will be implemented during the installation of the TBCW and during the till water pump tests. Access restrictions will consist of an 8-foot high chain-link fence maintained around the perimeter of the Site. As stated above, the eastern portion of this fence will be removed during the installation of the TBCW. The fence for the adjacent Northside Landfill will provide adequate protection during the absence of the eastern Site fence.

Before entering and leaving the Site, all personnel and visitors will be required to sign in and out at the main office of Boone County Resource Recovery. Additional details regarding Site access restrictions are presented in the Site Health and Safety Plan (HASP) for the installation of the TBCW. The HASP has been included as Appendix B.

2.3 Erosion and Sedimentation Control Measures

The TBCW will be installed in such a manner to minimize soil erosion and prevent any impacts to Unnamed Ditch and the ECC diversion channels that drain into Unnamed Ditch. A Soil Erosion/Sediment Control and Pollution Prevention Plan for the installation of the TBCW using the

Vibrated Beam Method is included in Appendix C. The locations for the installation of silt fencing will be presented in the Contractor Submittals. A list of the required documents for the Contractor Submittals are contained in Appendix D.

The Contractor shall keep all excavations, embankments, stockpiles, temporary waste staging areas, and all other work areas within the project boundaries free from dust that would cause a hazard or nuisance to others or contaminate surface water. Visual assessments will be performed during construction activities to determine the need for dust control.

3.0 THIN BARRIER CURTAIN WALL

The TBCW will be installed along the east, south, and southwest sides of the Site, adjacent to the alignment for the presently proposed augmented SVE trench system. The TBCW will be approximately 1,100 feet long, 4 inches wide, and of varying depths. The location of the TBCW is shown on Drawing C-2. A profile view of the TBCW is shown on Drawing C-3, and cross-section views of the TBCW are shown on Drawing C-4.

The TBCW will consist of a slurry wall installed using the Vibrated Beam Method.[3] The vibrated beam installation technique utilizes a special crane-suspended I-beam connected to a powerful vibrator. The beam is locked in a guide frame for exact positioning and stabilized by a hydraulic foot that provides guidance and aids in keeping the wall vertical. Slag cement/attapulgite clay slurry is injected, under pressure, through a set of nozzles located at the base of the vibrated beam. At the completion of each panel, the rig is moved along the direction of the wall, the previous insertion is overlapped to ensure continuity, and the entire process is repeated.

The design and installation procedures for the TBCW are presented in Appendix A and summarized below.

3.1 Thin Barrier Curtain Wall Design

The TBCW will consist of a stable colloidal suspension of slag cement/attapulgite clay slurry. The slurry will have long-term compatibility with the Site contaminants. The required properties for the TBCW are:

- The slurry shall be non-erodible.
- The mix shall achieve an *in situ* hydraulic conductivity of less than or equal to 1×10^{-7} centimeters per second (cm/sec.).
- Viscosity at the point of injection shall not be less than 35 marsh funnel seconds.
- Minimum slurry temperature during installation shall be 35 degrees Fahrenheit.
- The density of the slurry as tested on the mud balance shall be in the range of 68 to 75 pounds per cubic foot (lbs/ft^3).

[3] Patent held by Slurry Systems, Inc. of Gary, Indiana.

3.2 Thin Barrier Curtain Wall Installation

The TBCW will be installed along the alignment shown in Drawing C-2. Alignment of the TBCW shall be within 1 foot of the alignment provided in Drawing C-2 or approved in the field by the Trust's Engineer. The alignment of the TBCW will be marked on-site by the Trust's Engineer.

The beam shall be inserted with plumbness within 1% of vertical and each insertion will overlap the previous insertion by a minimum of 3 inches, plus the 14-inch fin. The beam shall be inserted to the required depth by a vibratory driver vibrating at its maximum rate and shall be extracted at a rate suitable for the proper injection of slurry. The final TBCW depth shall be as specified in Drawing C-3 and the depth will be carefully monitored by survey and Site measurement methods. The Contractor shall provide a positive means for determining the final bottom elevation of the wall, and the bottom elevation of the TBCW shall, at all points, meet the approval of the Trust's Engineer.

The TBCW will be installed with minimal soil excavation requirements. A 2-foot wide by 2-foot deep reservoir trench will be excavated along the TBCW alignment prior to the installation of the TBCW. The excavated soils from the reservoir trench will be used to construct a temporary berm on the outside edge of the trench to prevent any slurry or water from leaving the trench and migrating toward Unnamed Ditch. The pumping pressure of the slurry shall be such as to maintain a full reservoir trench.

The completed TBCW shall be free from: lumps of clay greater than 2 inches in diameter; lumps of silt; and pockets of sand, soil, or gravel. The completed TBCW will be continuous and no gaps with a minimum thickness of 4 inches.

The geotextile will be place in the trench with a minimum 3 feet overlap at ends along the alignment. Soils excavated from the reservoir trench, used to construct the adjacent berm, will be used to backfill the trench. The backfill will be placed in at least two lifts and compacted in the reservoir trench to match the elevation of the existing ground surface.

3.3 Utility Crossings

The TBCW will be required to cross two concrete culvert pipes near the southwest corner of the Site. The Contractor will temporarily remove the concrete culvert pipes in the area where the intersection occurs, construct the TBCW wall, excavate that portion of the wall, and replace the pipe sections. The area around the replaced pipe sections shall be backfilled with the same slurry mixture used to construct the TBCW at least 5 feet on either side of the TBCW. Drawing C-4 shows the design details for the completed intersection of the TBCW and the concrete culvert pipes.

Power lines located at the southwestern corner of the Site will be de-energized and/or removed temporarily during construction near the entrance gate power poles. The Contractor will be responsible for arranging for de-energization of the power lines or removing and replacing these lines, as necessary.

Two wastewater carrier pipes and a communication cable, connecting the adjacent Third Site to the ECC treatment building, current crosses the proposed alignment for the TBCW. One carrier pipe is a double-walled high-density polyethylene (HDPE) pipe with a 6-inch and 3 inch diameter.[4] The second carrier pipe is a single walled 3-inch diameter HDPE pipe and the communication cable is contained in a ¾-inch diameter PVC conduit. Prior to the installation of the TBCW, the carrier pipes and communication cable currently located along the TBCW alignment will be moved to the southwestern edge of the South Diversion Channel. The carrier pipes and cable will be placed in such a manner that they only cross the TBCW alignment at the location of the concrete culvert, which connects the South Diversion Channel to the Southern Support Diversion Channel. The TBCW installation will begin at the northern portion of the Site, and will extend south, then west along the proposed alignment. When the TBCW reaches the culvert and the Third Site carrier pipes and cable, the pipes and cable will be cut, where it intersects the TBCW alignment, moved to the back side of the TBCW installation equipment, and immediately refused together. This operation will be done in such a manner as to minimize the disruption of Third Site operations. It is expected that the carrier pipes and cable will be out of operation for no more than 8 hours. The current and proposed alignment for the Third Site wastewater carrier pipes and cable is shown on Drawing C-1.

3.4 Quality Control

The Contractor will establish and maintain quality control procedures for the installation of the TBCW. A Quality Control Plan for the installation of the TBCW using the Vibrated Beam Method has been included as Appendix E.

3.5 Performance Verification and Monitoring

Four sets of piezometers will be installed along the length of the TBCW in order to monitor hydraulic gradients in the till and sand and gravel units. One pair of piezometers for each set will be installed on either side of the TBCW within the till unit. The third piezometer for each set will be installed within the sand and gravel unit, adjacent to the upgradient till unit piezometer. Three of the piezometer sets will be installed in the general areas of former till wells T-6, T-8, and T-9. These locations will provide a comparison of historic till water levels with water levels established following installation of the TBCW. The fourth set of piezometers will be installed at the western end of the TBCW to verify that on-site subsurface water is not migrating around the TBCW. The locations of the piezometers and the design details for the till and sand and gravel piezometers are shown on Drawing C-2.

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[4] The 6-inch HDPE pipe (6-inch SDR 11) has and outside diameter of 6.625 inches, and inside diameter of 5.421 inches, and a weight of 4.97 pounds per linear foot. The 3-inch HDPE pipe (3-inch SDR 11) has and outside diameter of 3.500 inches, and inside diameter of 2.826 inches, and a weight of 1.39 pounds per linear foot.

Soil cuttings generated during the installation of piezometers will be containerized and stored at the Site decontamination pad. The soils will be characterized and addressed during the construction of the augmented SVE system. Procedures for testing, treating, and disposing of soil cuttings will be presented in design documents for the augmented SVE system.

4.0 TILL WATER PUMP TESTS

The performance tests will consist of pumping water from three existing wells (T-1, HS-1, and HS-2). Based on the soil boring logs for these wells and geologic data presented on cross-sections presented in Attachment Z-1, testing at wells HS-1 and HS-2 is expected to be representative of pumping conditions at the augmented SVE trench segments placed at the southern end of the Site, particularly those trenches that intersect the former Southern Concrete Pad Area.. Testing at well T-1 is expected to be representative of the trench segments to be placed along the northern portion of the Site in the vicinity of the area where former SVE operations have been conducted.

The performance tests will be conducted by the Trust's Engineer and will consist of pumping water from each of the test wells until the water level in the well is within 1.5 foot of the bottom of the well. The water level in each pumping well will then be maintained at this level for a minimum duration of 24 hours. For test well HS-1, water levels within HS-1 and adjacent wells HS-1A and IW-5 will be monitored for the duration of the test, and for a period of 12 hours following completion of the test. For the tests at wells T-1 and HS-2, the water levels within these wells will be monitored for the duration of the test, and for a period of 12 hours following the completion of the test.

The pumping rate required to initially dewater each well, the pumping rate required to maintain the dewatered condition, the total volume of water removed from each well, and the time required to dewater the well will be recorded. Water levels within the pumping wells and nearby monitoring wells will be collected at regular intervals (one or more measurements per minute) using pressure transducers and a data logger. The performance tests for each well will be conducted independently of each other and there will be at least a 12-hour separation between the completion of pumping for one test and the start of the next.

If the till water pump tests, as described above, cannot be completed in either of the pumping wells due to an inability of pumping to dewater the well to within 1.5 feet of the bottom of the well, a step drawdown test will be conducted within that well. The step drawdown test will be conducted by pumping the well at three or more successive pumping rates, for 2 hours at each successive rate, while allowing the water level within the pumping well to stabilize for each pumping rate. To predict the steady state pumping rate required to dewater the well to within 1.5 feet of the well bottom, the step drawdown data will be analyzed using the Hantush-Bierschenk's method.[5]

The wastewater generated during the till water pump tests will be containerized and treated using the existing wastewater treatment system.

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[5] Hantush, M.S. 1964. Hydraulics of Wells. In: V.T. Chow (editor). Advances in Hydrosciences, Vol. I. pp 281-432. Academic Press, New York and London.

5.0 SCHEDULE

Upon USEPA approval of this Design Report, a contractor will be retained to install the TBCW on a schedule to be submitted to the USEPA. The Contractor will be required to prepare Contractor Pre-Construction Submittals, including a construction work plan, a site specific HASP, and work schedule. After review by the Trust, the Contractor Submittals will be provided to the USEPA.

DRAWINGS

SDMS US EPA Region V

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APPENDIX A

Slurry Wall Design and Installation Procedures

Slurry Systems INC.
THE DRIVING FORCE SM

SLURRY WALL DESIGN AND INSTALLATION PROCEDURES FOR VIBRATED BEAM SLURRY WALL

ENVIRO-CHEM CORPORATION
ZIONSVILLE, IN

PREPARED BY

SLURRY SYSTEMS INC. (SSI)

September 2005

I. INTRODUCTION

This document describes Slurry Systems', Inc. (SSI's) proposed cut-off wall design and installation procedures.

SSI was established in 1977 as a specialty contractor. SSI has installed over 100 impervious slurry cut-off walls nationwide, including Canada. SSI frequently uses its specialty vibrated beam technique for slurry wall installation. SSI recently has acquired patents for installing pervious walls and installing sheet pile in hard, dense soils where conventional methods fail.

II. CUT-OFF WALL DESIGN

The project includes the construction of a vibrated beam slurry wall (*in situ* permeability of 1 x 10-7 cm/sec or less) of approximately 27,500 square feet which is about 1,100 feet long and averages 25 feet in depth. The slurry wall will be an average width of 4 inches. The slurry used will be IMPERMIX®. IMPERMIX® is an excellent option for this cut-off wall application. Typically, IMPERMIX® has an *in situ* permeability of less than or equal to 1 x 10^{-8} cm/sec.

A specialized crane will install the slurry wall from the work ground surface to the lower sand and gravel unit interface with an approximate 2-foot key-in to this interface.

III. MIX DESIGNS AND MIX COMPONENT MATERIALS

The proposed mix design for the project is an IMPERMIX® slurry composed of the following materials.

- Attapulgite Clay
- Slag Cement
- Water

Mixing of the materials is conducted in a controlled mixing plant manufactured by SSI located on the job site and the materials, subsequently, are deposited directly into their final *in situ* position. Continuous injection and a unique on-site mixing plant makes stringent control of slurry mixes possible. The mixing pump is a high-speed colloidal pump that allows complete blending of the attapulgite clay, slag cement, and water. After blending, the slurry is transferred to a two-stage Moyno pump that allows for varying discharge pressures.

The IMPERMIX® slurry shall be mixed to achieve:

- *In situ* permeability of 1 x 10^{-7} cm/sec or less as measured in the wall after 60 days of setting.

- Marsh funnel greater than or equal to 35 seconds.
- Unit weight of slurry as measured on the mud balance shall be in the range of 68 to 75 lbs/ft^3.

IV. EQUIPMENT

It is anticipated that SSI will utilize the following equipment and facilities during vibrated beam slurry wall construction:

- FUNDEX F-12 (80,000 lbs. specialized crane) or Liebherr Crane 853 HD for vibrated beam slurry wall installation.
- PTC 2-75 Vibrator or 60 HD
- Specially Fabricated Vibrated Beam
- 8,000 lbs. Rough Terrain Forklift (CAT TH-82 or similar) for material handling
- Mini Combination Backhoe
- Mixing Plant - specially fabricated high-speed/high-shear colloidal mixing plant along with associated pumps and piping.
- 250 KW Generators (2) for the mixing plant and for the vibrator
- Backhoe (Bobcat 331 or similar) for construction of reservoir trench, 2 feet by 2 feet along wall alignment
- Office, Crew, and Tool Trailers
- Trucks and Other Small Tools

V. LABOR

It is anticipated that SSI will utilize the following labor during construction:

- Project Superintendent/Quality Control Specialist (1)
- Operators – Class 1 (2)
- Pile Driver – Journeyman (2)
- Laborer (1)

SSI typically utilizes one in-house project supervisor/quality control specialist, one in-house crane operator, one in-house operator at the mixing plant, two in-house beam technicians ensuring verticality and continuity of the beam, and one journeyman or laborer for breaking of bags. With the closed system and little excavation, the safety level required for on-site personnel is minimized.

Our in-house project supervisor is Mike Roberts. Mr. Roberts has over 35 years experience in the supervision of construction sites specific to containment operations/environmental problems (slurry walls both with the conventional method and the vibrated beam method of emplacement), pile driving projects, inclusive of bearing pile, sheet piling, cofferdams, gate and funnel installations, and Waterloo® grouted sheet pile. He has extensive experience with working in many steel mills and has driven

hundreds of pile in USX. In addition, he has much experience in working with governmental entities such as the Army Corps of Engineers and the Department of Defense. He has been a pile driver with UBC 578 for over 25 years and consequently, has much experience in working under union regulations.

Our in-house crane operator is Lyle Prentice (International Union of Operating Engineers Local 150). Mr. Prentice has been operating SSI's F-12 crane since 1991, over 14 years. He has completed over 26 slurry wall projects, of which 8 projects were in excess of 35 feet in depth and exceeded 1,000 linear wall feet. The most recent project completed, over 35 feet was in Georgetown, WA at Philip Services. At this site, Mr. Prentice installed 1,600 linear feet of vibrated beam slurry wall using IMPERMIX® at an average depth of 75 feet. This project was performed for Geomatrix and designed by URS. Mr. Prentice operates all of SSI's cranes for installing sheet piles and bearing piles. He is extremely knowledgeable of the workings of the equipment. Safety is of utmost concern for Mr. Prentice. He has operated the cranes on 95% of SSI's projects since 1991.

VI. CONSTRUCTION PROCEDURES

1.0 Mobilization

Following approval of the required submittals, SSI will mobilize equipment, materials and personnel to the site. SSI will assemble the mixing plant in the appropriate staging area. SSI will stage attapulgite clay and slag cement bags for slurry mixing in the vicinity of the mixing plant.

2.0 Site Preparation

Site preparation activities, by others, will include but are not limited to the following tasks:

- Field location of utilities
- Set-up of field offices and facilities
- Marking of work limits
- Installing erosion and sedimentation controls
- Installation of project sign and safety signs
- Surveying of slurry wall alignment

3.0 Work Platform and Staging Area Construction (by others)

The work platform will have a minimum width of 15 feet (preferably 16 to 24 feet) and will be level, dry, and stable (gravel) to support construction equipment. The final elevation of the work platform will be a minimum of 3 feet above the groundwater table. An overhead clearance of 90 feet must be obtained along the work platform and wall alignment. Prior to construction, any/all electrical line crossings must be removed for SSI's slurry wall construction per

OSHA standards. The staging area shall be a minimum area of 100 feet by 100 feet.

4.0 Cut-off Wall Construction

SSI will mix attapulgite clay, slag cement, and water for slurry preparation for construction of the slurry cut-off wall in an on-site mixing plant. Slurry hoses from the mixing plant connect to the top of the vibrated beam so that the slurry injected is in a closed system. The cut-off wall materials are detailed in the Section II and III above.

The vibrated beam method, to create a cut-off wall with an average wall thickness of 4 inches. This method consists of vibrating a customized, built-up steel, 33-inch I-beam from the surface to the required depth while the pre-mixed slurry is injected through nozzles affixed to the bottom of the beam. The slurry is injected during insertion and extraction of the beam. The beam is guided by a fixed lead.

After the vibrated beam attains the required depth, the beam will be extracted at a controlled rate to fill the void left by the beam extraction, creating an in-ground panel of slurry. This process is repeated along the line of the wall, with each beam insertion overlapping the previously inserted panel. The continuous slurry wall is created by overlapping each 33-inch beam penetration (panel) by approximately 17 inches. The subsequent beam insertions overlap the previous by a total of 17 inches (14 inches of fin, plus 3 inches of I-beam). The proper distance is measured for each beam penetration.

No excavation is required for the vibrated beam method, except for a 2-foot wide by 2-foot deep reservoir trench along the wall alignment. This trench remains full of slurry during beam emplacement ensuring a continuous wall (e.g., voids). The main reason for the retention of slurry in the trench during installation of the slurry wall is to fill any void spaces such that a continuous wall is formed. If a small void is encountered during beam penetration, there may be enough volume of slurry in the trench to fill it. However, with larger voids, backfill, generally sand, may be required to fill the void and then the beam will be re-driven through the backfilled material. During backfilling, the vibratory rig will move ahead and try another area. Upon completion of backfilling, the vibratory rig will return to the void area and redo the slurry wall. If an obstruction is reached that the beam cannot penetrate, there are two possible solutions which are dependent on field conditions. One solution is to backfill after discovering the void/obstruction and if an obstruction, remove the obstruction. Another solution would be to simply circumvent the void/obstruction.

APPENDIX B

Health and Safety Plan

SITE HEALTH AND SAFETY PLAN

Design Report for
Thin Barrier Curtain Wall

Prepared for:

Enviro-Chem Corporation Trust

Submitted to

U.S. Environmental Protection Agency, Region 5
and
Indiana Department of Environmental Management

Submitted by

ENVIRON International Corporation
Deerfield, IL 60015

September 2005

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Attachment 1: Respiratory Protection Program
Attachment 2: Protective Equipment and Decontamination Procedures
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I. INTRODUCTION

This Site Health and Safety Plan (HSP) is specifically prepared for:

Project Location: Enviro-Chem Corporation (ECC) Superfund Site, 985 Hwy 421, Zionsville, Indiana
ENVIRON Case Number: 21-6585K

This HSP has been developed to protect the health of personnel involved in Site activities and the surrounding community and is consistent with the following regulations and guidance:

- 20 CFR 1910.120 (i)(2) – Occupational Health and Safety Administration (OSHA): Hazardous Waste Operations and Emergency Response, Interim Rule, December 19, 1986.
- USEPA Order 1440.2 – Health and Safety Requirements for Employees Engaged in Field Activities.
- USEPA Order 1440.3 – Respiratory Protection.
- USEPA Occupational Health and Safety Manual.
- USEPA Interim Standard Operating Procedures (September 1982).

All personnel participating in the field must be trained in the general and specific hazards unique to the job and, if applicable, meet recommended medical examination requirements (see Sections VI and VII for personnel training requirements and medical surveillance program, respectively). All Site personnel and visitors shall follow the guidelines, rules, and procedures contained in this HSP. The Project Coordinator or Project Safety Officer may impose any other procedures or prohibitions believed to be necessary for safe operations.

This plan is prepared to inform all field personnel of the potential hazards on the Site. However, all Site contractors and subcontractors must assume direct responsibility for their own employees' health and safety.

A. Site Location: ECC Superfund Site, 985 Highway 421
Zionsville, Indiana

B. Plan Prepared: Scott Hayter, P.G. / Cynthia Bonczkiewicz, P.E.
September 2005

II. GENERAL INFORMATION

The responsibilities of safety personnel, emergency telephone numbers, and the address of, and evacuation route to, the nearest hospital are included in the following subsections. Certain personnel and contact numbers will be available for each major task after the task's contractors have been selected.

A. Project Safety Officer

A Project Safety Officer (PSO) will be assigned for the project. The PSO will be responsible for ensuring that all project personnel on-site during that phase of work comply with the provisions of this HSP. The PSO is responsible for ensuring that proper medical surveillance is maintained, providing hazard communication information, training employees in safe operating procedures, and advising the Project Coordinator on any matters concerning the health and safety of the project personnel or the public.

Also, an On-Site PSO will be assigned for each project task. The On-Site PSO is responsible for the implementation of this HSP and will verify compliance with the HSP at the work Site. The On-Site PSO will supervise daily safety, decontamination, and environmental monitoring activities associated with the field work and report to the PSO and Project Coordinator. In addition, the On-Site PSO will maintain a daily log of field activities and monitoring to ensure compliance with the HSP. Both the PSO and On-Site PSO (and all on-site personnel) have the authority to stop work in the event of an emergency, equipment breakdown, unsafe procedure, or unsafe condition. The PSO and the On-Site PSO have the authority to start work following any stoppage.

If modifications to this HSP are warranted based on field conditions, the On-Site PSO will ensure that all activities that are affected by such changes are delayed until the required modifications are implemented in writing. The Project Coordinator, after conferring with the On-Site PSO, will be responsible for notifying USEPA and the Indiana Department of Environmental Management (IDEM) of the necessary HSP modifications and for receiving approvals of any such modifications before proceeding with the affected work.

The foregoing organizational structure will be periodically reviewed and updated as necessary to reflect the current status of operations at the work Site. Frequent and regular inspections of Site operations will be conducted to ensure compliance with this HSP.

B. Emergency Facilities and Agencies

If an emergency occurs at the Site, appropriate emergency agencies will be contacted. The following emergency telephone numbers will be recorded in all field notebooks and posted at the decontamination facilities:

Agency	Telephone Number
National Response Center	800/424-8802
USEPA	800/621-3191
IDEM	317/233-7745
Zionsville Ambulance Service	911
Zionsville Fire Department	911
Zionsville Police Department	911
Boone County Health Department	317/482-3942
St. Vincent Hospital	317/338-2345
Poison Center	800/942-5965

The Emergency Routes to the Hospital (Figure 1) will be in the possession of all field personnel and posted at the decontamination facilities.

C. Key Project Personnel

The following personnel will have the primary responsibility for ensuring conformance with the HSP:

Title	Name	Affiliation and Telephone Number
Project Coordinator	Ronald E. Hutchens	ENVIRON (847) 444-9200
PSO	Mark Watka	ENVIRON (312) 853-9430
On-Site PSO/Site Supervisor	Scott Hayter	ENVIRON (847) 444-9200

The Project Coordinator is responsible for ensuring that the work at the Site is performed in a safe manner, and that all legal and safety requirements are met. The On-Site PSO is the designated Site Supervisor. It is the duty of the Site Supervisor to maintain Site security; supervise on-site employees; and ensure that all procedures (e.g., health and safety, decontamination, and protective equipment) are followed.

D. Other Project Personnel

ENVIRON personnel will be responsible for overseeing the sampling and monitoring activities in cooperation with the On-Site PSO.

Subcontractors will be required to conduct all on-site activities under the direction of the subcontractor's On-Site PSO and in accordance with this HSP at a minimum. If a subcontractor's health and safety program is more stringent than this HSP, the subcontractor's employees must abide by the more stringent plan.

III. SITE BACKGROUND INFORMATION AND PLANNED ACTIVITIES

A. Site Description

1. Site Location and Physical Setting

ECC is located in Boone County, north of Zionsville, Indiana, approximately 10 miles northwest of Indianapolis. The area is primarily agricultural but also contains some areas of commercial and industrial land use.

2. Present and Past Site Operations

There are no current operations at ECC. Portions of the ECC area were used for tank and drum storage in the mid-to-late 1970s. The types of materials stored are not well defined; however, it is understood that these materials consisted primarily of solvents and other liquid wastes.

Between 1987 and 1990, field investigations of the Site were conducted by Environmental Resources Management-North Central, Inc. (ERM-North Central), on behalf of the ECC Potentially Responsible Parties, and by CH2M Hill. The results of the soil and ground water investigations indicated that the primary significant chemical constituents found at the Site include chlorinated volatile organic compounds (VOCs) and some semivolatile organic compounds (SVOCs). Remediation activities including excavation of the Southern Concrete Pad area and installation of a soil vapor extraction (SVE) system on the North and Central Treatment Areas were conducted in 1998.

3. Contaminants of Concern

The parameters listed in Table 1 are the contaminants of concern for the Site.

B. Project/Task Description

The Augmentation of the SVE System is being completed under Attachment Z-1 which enhances and replaces the water interception trench originally required as the Additional Work in Revised Exhibit A. The first task of the Augmentation of the System included the installation of a thin barrier curtain wall along the east, south and southwest sides of the ECC Site, installation of associated piezometers, and till water extraction performance testing. This HSP will be updated to include each major task comprising the Augmentation of the SVE System.

C. Hazardous Incidence History

No incidents involving specific releases or spills of hazardous chemicals are known to have occurred at the Site since at least 1983.

IV. NATURE OF POTENTIAL HAZARDS

A. Chemical Hazards

Table 1 contains a summary of the primary VOC and SVOC contaminants historically detected at ECC and the corresponding OSHA permissible exposure limits (PELs), the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs), the NIOSH immediately dangerous to life or health (IDLH) concentrations, the lower of the OSHA or NIOSH short-term exposure limits (STELs), the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and NIOSH recognition qualities. The symptoms of overexposure, potential chronic effects, and immediate emergency responses associated with these contaminants are provided in Table 2.

The PELs in Table 1 are legal and enforceable standards set by OSHA that must NOT BE EXCEEDED during any 8-hour work shift of a 40-hour work week. The NIOSH RELS are recommendations that are not legally enforceable but are provided for reference. RELs are the time-weighted average (TWA) worker exposure concentrations recommended by NIOSH for up to a 10-hour workday during a 40-hour workweek. The IDLH concentrations represent the maximum concentration from which, in the event of respirator failure, a person could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects. The STELs are 15-minute TWA exposures that should not be exceeded at any time during a workday. The TLVs are 8-hour TWA maximum worker exposure concentrations.

Table 3 presents the results of the hazard analysis for Task 1 of the Augmentation of the SVE System. Table 3 includes pathways of exposure to chemical hazards, potential for worker exposure without implementing the HSP-prescribed protective measures, and recommended protective measures. The hazard analysis demonstrates that the primary potential hazard to on-site workers is dermal contact with contaminated soil or ground water, and inhalation of organic vapors.

The following minimum level of chemical-resistant apparel is required for all tasks performed in the exclusion zone (as defined in Section V of this health and safety plan): chemical-resistant safety shoes, chemical-resistant gloves, and hard hats (when overhead equipment or structures are present). During intrusive or sampling activities, protective clothing as described in Section IX.B is required.

As indicated on Table 4, hazard monitoring at ECC will include real-time screening of organic vapors in the breathing zone by using a photoionization detector (PID). The screening results will be compared to action levels that trigger a requirement for personal protection measures. The general respiratory program followed by ENVIRON is included as Attachment 1.

A PID will be used to perform air screening in the breathing zone at the work areas. If a sustained (for 3 minutes or longer) organic vapor concentration reading equal to 5 volumetric parts per million (Vppm) above background is obtained in the breathing zone, Level C respiratory protection in accordance with Section IX.A will be required (see Table 4). If sustained organic

vapor concentrations exceed 5 Vppm above background, work conditions will be modified or respiratory protection as described in Section IX.A will be initiated. If organic vapors are not detected and a sustained reading over 5 Vppm in the work area or in the exclusion zone, Level D protection will be worn. All preventative maintenance and calibrations of the PID meter will be performed in accordance with the manufacturer's operation manual.

In addition, precautions should be taken to avoid the following potential exposure pathways, which represent lower overall potential hazards:

- Ingestion of contaminated ground water,
- Ingestion of contaminated surface water,
- Ingestion of contaminated surface soil, and
- Eye contact with contaminated materials.

To mitigate these potential hazards, a thorough program of personal decontamination and hygiene will be maintained during the Site activities.

B. Physical Hazards

The primary physical hazards associated with the investigation activities are heat stress and cold weather exposure. Other potential physical hazards to on-site personnel include falling, tripping, slipping, exposure to excessive noise, and impact by heavy equipment. Hazards related to utilities will be identified and assessed prior to the commencement of each phase of work. Prior to construction of the thin barrier curtain wall in the southwest portion of the Site, an electric supply line will be temporarily removed. All required utility clearances will be covered during the site-specific safety training.

1. Heat Stress

Heat stress may be of concern during Site work. Impermeable protective clothing, such as chemical-resistant Tyvek coveralls, reduces the body's ability to dissipate heat, and thereby increases the risk of heat-related problems. One or more of the following measures will be used to control heat stress:

- An adequate supply of cold potable water or a commercial electrolyte solution mix will be provided to all employees. Any container used to distribute the water or electrolyte mix will be clearly marked.

- Employees will be informed of the symptoms of heat stress and heat exhaustion. (The usual signs and symptoms of heat exhaustion are cool, pale, and moist skin;

heavy sweating; dilated pupils; headache; nausea; dizziness; and vomiting. Body temperatures will be nearly normal. Heat stroke is life threatening. Symptoms of heat stroke include hot, red skin; very small pupils; and a very high body temperature - sometimes as high as 105° F. The skin could be wet from perspiration or dry.)

- Employees involved in work tasks requiring the use of impermeable clothing will be required to take periodic breaks.

- All breaks will be taken in a shaded rest area after any required decontamination procedures have been followed. During rest periods, employees will be required to remove impermeable protective garments.

- Shifts of workers will be rotated, as necessary, to reduce the effects of heat stress. In extremely hot weather, operations will be conducted in the early morning or evening.

- All employees will be informed of the importance of adequate rest, replacement of lost body fluids, and proper diet to prevent heat stress.

2. Cold Weather Exposure

During the winter months, cold weather exposure will be an occupational concern resulting from: (1) the ambient temperature, (2) the wind velocity, and (3) the presence of moisture.

The following precautions will be used to avoid potential frostbite injuries or hypothermia during the field work.

- Thermal socks, thermal underwear, hard hat liners, or other cold weather gear will be provided to employees.

- Periodic breaks will be required during cold weather field activities, and an adequate supply of potable water and warm drinks will be provided. Any container used to distribute water or warm drinks will be clearly marked.

- Employees will be instructed to recognize the symptoms of exposure (hypothermia) and frostbite. (The first sign of frostbite may be slightly flushed skin. The skin color then changes to white or grayish yellow and finally to grayish blue. Pain is

sometimes felt early on but goes away later. The frostbitten area feels cold and numb, and the employee may not be aware of the injury. The signs and symptoms of hypothermia include shivering, dizziness, numbness, confusion, weakness, impaired judgment, impaired vision, and drowsiness. As hypothermia progresses, the employee may move clumsily and have trouble holding things. In later stages, he or she may stop shivering.)

- Employees who become wet from perspiration or precipitation will be instructed to return to the trailer or van and get resuited.

- Cold weather exposure hazards will be discussed during the site-specific safety training program that will be conducted prior to the initiation of the field activities.

3. Other Physical Hazards

Additional risks are associated with injuries resulting from tripping over tools or equipment, slipping on wet or icy surfaces, or being exposed to noise from activities in excess of acceptable limits. For personnel working in areas adjacent to heavy equipment (e.g., a drill rig), hearing protection will be used. Field personnel will be made aware that protective apparel and equipment may limit visibility, hearing, and manual dexterity. As a result, the physical hazards of certain field activities will be increased. Specific precautions to prevent injuries related to physical hazards are covered in the general work procedures presented in Section V.

C. Protection from Exposure to Hazards

Engineering controls, work practices, PPE, or a combination of these will be used to protect employees from exposure to hazardous substances and safety and health hazards. The task-specific applications of the engineering controls and the work practices are described in Table 5.

Typical engineering controls applicable to hazardous waste sites include the: (1) zoning of the Site; (2) characterization of the Site; and (3) use of dikes, ventilation, pressurized cabs or control booths on equipment, and remotely operated equipment.

Typical work practice controls that may be feasible at hazardous waste Sites include: restricting all nonessential employees from the area of potential exposure; wetting down dusty operations; and locating employees upwind of possible hazards. Section V describes the task-specific work practices that must be followed during the thin barrier curtain wall installation activities.

Whenever the use of engineering controls and work practices by themselves would not eliminate all of the hazards, a combination of PPE, engineering controls, and work practices will be used to reduce and maintain exposure levels at or below the site-specific PELs.

V. GENERAL WORK PROCEDURES

This section presents an overview of the health and safety issues associated with the fieldwork to be conducted at ECC during the till water extraction performance testing and the completion of the thin barrier curtain wall and associated piezometer installation.

A. Supervision and Audits of Safety Procedures

The fieldwork will be audited by the PSO to ensure compliance with the HSP. The frequency of audits will depend on the duration of the fieldwork and the type of work to be conducted. If no exposure is expected to occur (e.g., during the collection of ground water samples from monitoring wells that have never shown any contamination or on a Site walk-through), no audits will be required. The On-Site PSO will specify the level of protective clothing for field personnel involved in the investigation activities based on the parameters outlined in Section IX of this HSP. All air monitoring (screening) required to determine the level of respiratory protection needed for specific field activities will be the responsibility of the On-Site PSO.

If there is an accident, exposure to contamination, or other emergency occurs, the On-Site PSO (or any on-site personnel) will stop work, and the On-Site PSO will determine the appropriate response actions. Field personnel will be instructed to leave the area immediately and to remain in their protective gear, and injured personnel will be removed from the immediate hazard. The evacuation plan to be followed during the fieldwork is described in detail in Section XI. The On-Site PSO will re-evaluate the evacuation routes determined prior to the initiation of fieldwork and establish rendezvous points. If necessary, the evacuation routes will be modified, and an updated version will be posted at the Site and distributed to all appropriate on-site personnel.

B. Site Control Measures and Delineation of Work Zones

The On-Site PSO will have discretion over the establishment of Site control and the delineation of specific work zones to reduce the possibility of exposure to contamination at the Site. Individuals without proper personal protective gear will be restricted from these zones, and authorized personnel or equipment leaving contaminated areas of the Site will be decontaminated to prevent the spread of contaminants. Personnel and equipment in the exclusion zone will be minimized. The possibility of exposure or translocation of Site contaminants will be reduced by establishing three contiguous work zones as follows:

Zone 1: Exclusion Zone

The exclusion zone will be delineated upon commencement of the field activities. This area may include drilling, excavation, sampling, and measurement locations where contact with impacted Site ground water or soils is likely. All personnel entering the exclusion zone must

wear the level of protection specified by the On-Site PSO. An entry and exit checkpoint will be established at the periphery of the exclusion zone, and the flow of personnel and equipment into and out of the zone will be regulated to verify that established procedures are followed.

Zone 2: Contamination Reduction Zone

A contamination reduction zone will be established at the Site adjacent to the exclusion zone to provide a transition between contaminated and clean areas. Protective gear worn by personnel will be cleaned and removed in Zone 2 before a person enters a clean area. All decontamination facilities for personnel and equipment will be located within this zone.

Zone 3: Support Zone

A support zone will be established at the Site in an uncontaminated or clean area at the periphery of the Site, upwind of intrusive sampling areas when possible. The support facilities located in this zone will contain potable water, a rest area, and an eating area. These support facilities will meet the requirements of 29 CFR 1910.120(n). Because normal work clothes are appropriate within the support zone, protective gear that has not been decontaminated will not be allowed in Zone 3.

The On-Site PSO will be responsible for delineating and controlling access to work zones and ensuring that the exclusion, contamination reduction, and support zones are adequately delineated. Additionally, the level of protection required in the exclusion zone and contamination reduction zone will be specified by the On-Site PSO.

The normal workday will begin after dawn and end before dusk. However, if Site operations continue at night, the work areas will be lighted to at least the minimum illumination intensities listed in 29 CFR 1910.120(m).

C. General Work Rules for Field Activities

The following is a list of general safety rules to be followed by all personnel involved in field activities at ECC:

Personal Precautions

- Eating, drinking, chewing gum or tobacco, smoking, or performing any other practice that increases the probability of hand-to-mouth transfer and ingestion of material will not be allowed within the exclusion or contamination reduction zones.

- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

- No facial hair that interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel required to wear respirators.

- Contact with contaminated or suspected contaminated substances should be avoided (e.g., avoid walking through puddles or leachate, or on discolored surfaces; kneeling on the ground; or leaning against, sitting on, or placing equipment on drums, containers, or the ground).

- Prescribed drugs should not be taken by Site personnel on response operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. In addition, prescribed drugs shall not be taken by personnel on response operations, if there is a likelihood that the prescription will increase the effects of exposure to toxic chemicals. Alcoholic beverage consumption will not be permitted during the workday. During nonworking hours, alcoholic beverage intake should be minimized or avoided for as long as any employee is engaged in fieldwork.

Operations

- All on-site personnel must be trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, communications, and the signs and adverse effects of exposure to the hazardous substances present on-site.

- Required respiratory protective devices and clothing must be worn by all personnel going into areas designated as requiring protective equipment.

- Emergency equipment shall be placed in readily accessible locations within the support zone (see Section IX.D for a list of equipment).

- Contaminated protective equipment (e.g., respirators, boots, and gloves) shall not be allowed in the support zone until the equipment has been cleaned or properly packaged and labeled.

- Field monitoring equipment shall not be placed on potentially contaminated surfaces.

- On-site personnel will use the buddy system. At a minimum, a third person, suitably equipped as a safety backup, is required during initial entries into the exclusion zone during intrusive activities.

- Visual contact must be maintained between pairs of safety personnel on-site. Entry team members should remain close together to assist each other during emergencies.

- During continual operations, on-site workers act as safety backup to each other. Off-site personnel will provide emergency assistance.

- Personnel should practice unfamiliar operations prior to performing the actual procedure.

- Personnel should be aware of designated entrance and exit locations, rendezvous points, emergency escape routes, and established warning signals for Site evacuation.

- Communications using radios, hand signals, signs, or other means must be maintained between initial entry members at all times. Emergency communications should be prearranged in case of radio failure, necessity for evacuation of the Site, or other reasons.

- Personnel and equipment in the contaminated area will be minimized, consistent with effective Site operations.

- Work areas for the various operational activities will be established in accordance with the procedures described in Section V.B. Personnel must be aware of established work areas for various operational activities.

- Prior to going on site, personnel will be trained in procedures for leaving a contaminated area. Work areas and decontamination procedures will be established based on expected Site conditions. (See Section V.B).

- Fire prevention and protection protocols (e.g., appropriate signs for flammable liquids, and combustible or flammable material storage areas) will be established in accordance with 29 CFR 1926.150, Subpart F.

- All excavation work must comply with OSHA regulations established under 29 CFR 1926.

- Legible precautionary labels shall be affixed to containers holding waste, debris, or discarded protective clothing.

- Transportation and disposal of contaminated residuals from Site activities shall comply with all applicable local, state, and federal regulations.

Site Safety Plan

- This HSP, which has been developed for the till water extraction performance testing and construction of the thin barrier curtain wall and associated piezometers and will be amended as appropriate for subsequent phases of work for the Augmentation of the SVE System. It will be made available to all personnel and posted on Site.

- All Site personnel must be familiar with standard operating safety procedures and any additional instructions and information contained in this HSP.

- All Site personnel must adhere to the information contained in this HSP.

D. Task-Specific Safety Procedures for Field Activities

Task-specific safety protocols that must be followed by all personnel participating in the specified field activities are described in the following subsections. Although only the more general safety protocols are presented, all of the operations and the use of equipment must conform to the standards promulgated under 29 CFR 1910 and 29 CFR 1926.

1. Installation of Thin Barrier Curtain Wall

The potential hazards, equipment and required protective measures for installation of the thin barrier curtain wall are shown on Table 7. In addition, the thin barrier curtain wall contractor(s) will be required to provide more detailed task-specific health and safety procedures.

2. Installation of Piezometers

The procedures for installing piezometers are described in the Design Report for the Thin Barrier Curtain Wall. The potential hazards, equipment, and required protective measures for installation of piezometers associated with the thin barrier curtain wall are shown on Table 6.

3. Till Water Extraction Performance Tests

The procedures for the till water extraction performance tests are described in the Design Report for the Thin Barrier Curtain Wall. The potential hazards, equipment, and required protective measures for the till water extraction performance tests are shown on Table 8.

4. Non-intrusive Activities

The additional safety protocols shown on Table 8 will be implemented during non-intrusive activities that are not covered above and do not alter the physical condition of the Site. For the purposes of this HSP, these non-intrusive activities include, but are not limited to, Site surveys, walk-through inspections, audits, and assessments.

5. Air Monitoring

The air monitoring (screening) activities will provide data to aid in the protection of on-site personnel. Field screening with a PID will provide data for proper personnel protection. Ambient air conditions will also be monitored for wind direction and dust control activities, if required. Section VIII of this HSP presents a detailed discussion of the environmental monitoring and sampling activities.

VI. SAFETY TRAINING

All personnel involved in the field activities at the Site will be required to attend an initial, site-specific safety training program. The content of this program, which will include instructions concerning possible hazards, is outlined below:

1. Introduction to the hazardous materials/waste previously identified at the Site

    a. Definition of hazardous materials/waste
    b. Classification of hazardous materials/waste
    c. Potential for ignitability, corrosivity, reactivity, and/or toxicity

2. Toxicological effects of possible contaminants

    a. Expected exposure levels
    b. Routes of probable exposure
        - Respiratory tract
        - Dermal penetration
        - Ingestion
    c. Expected toxic effects
    d. The applicable OSHA and NIOSH exposure limits
    e. Carcinogens

3. Safety planning and principles to be used at the job Site

    a. Names and responsibilities of key project safety personnel
    b. Emergency medical care and treatment
    c. General safety practices
    d. Emergency telephone numbers
    e. On-site communications
    f. Prevention of biological injuries (such as bites and stings)

4. Respiratory protection level used on Site

    a. General principles
    b. Potential hazards

c. Protective measures provided by air monitoring (screening), including a discussion of the type and frequency of air monitoring at the Site
d. Response (evacuation) requirements activated by volatile organic levels exceeding Level B maximums in ambient air

5. Protective clothing requirements

a. Level of protection
b. Articles of protective clothing
c. Purpose of each article of protective clothing
d. Proper use of protective clothing

6. Decontamination

a. Concern regarding proper decontamination
b. Extent of decontamination required
c. Personnel decontamination under normal conditions
d. Personnel decontamination during medical emergencies
e. Decontamination of equipment
f. Disposal of contaminated materials

7. Review of the Site control measures and work practices that will be used during each operation

8. Emergency response plan

9. Spill containment procedures

10. Review of the HSP

All personnel working in the exclusion zone will have documentation that they have completed 40 hours of health and safety training, three days of supervised field experience, 8 hours of refresher training for the current year, if applicable, as well as the initial site-specific training outlined in this section. The On-Site PSO/Site Supervisor will have received an additional 8 hours of specialized supervisor training. Training and medical surveillance of on-site personnel will be in accordance with 29 CFR 1910.

Additionally, prior to the initiation of work each day, a safety review will be held to discuss any modifications to this HSP that may be warranted based on the activities during the previous day. The emergency procedures described in Section XI shall be reviewed regularly as part of the overall training program for Site operations.

VII. MEDICAL SURVEILLANCE

Prior to beginning work at the Site, each employee must receive a baseline or annual medical examination. The minimum medical monitoring requirements are as follows:

- Complete medical and occupational history,
- General physical examination including an evaluation of all major organ systems,
- Pulmonary function testing,
- CBC with differential,
- Blood chemistry screening profile,
- Urinalysis with microscopic examination,
- Audiometric testing,
- Visual acuity, and
- Electrocardiogram as directed by the occupational physician.

VIII. ENVIRONMENTAL MONITORING PROGRAM

Based on the results of previous Site investigations, the primary contaminants present at the Site are VOCs. Therefore, environmental health and safety monitoring performed during field activities will focus on screening for organic vapor concentrations of the ambient air in the immediate vicinity and downwind of sampling or work areas. A MiniRae 2000, or equivalent PID meter with an 11.7 eV lamp, will be used to conduct ambient air screening.

Ambient air monitoring (screening) will be conducted during all field activities. Prior to air monitoring during an intrusive activity, background readings will be obtained from an upwind, unaffected area. During intrusive work, the PID will be used to monitor the breathing zone of the workers and may be used periodically to check for organic vapors in the soil. All air monitoring results will be recorded in the On-Site PSO's field notebook and will be used to specify the level of respiratory protection required for each specific field activity.

To mitigate potential exposure to semi-volatile and inorganic compounds, work will be stopped under dusty conditions until dust subsides or until dust control measures (spraying of potable water) have been implemented. This precaution will also mitigate the possible transport of primary contaminants off-site.

IX. PERSONAL PROTECTIVE EQUIPMENT

The type of PPE required is dependent on the nature and location of the work being performed. All activities in the support zone will be performed under Level D protection, as described in the USEPA's Standard Operating Safety Guides. During drilling and sampling activities, respiratory protection will be upgraded, as necessary, based on the organic vapor screening results shown on Table 4. Decontamination and residual management activities will be conducted under Level D protection. The types of protective equipment needed for all three potential levels of protection (i.e., B, C, and D) are described in Attachment 2.

A. Respiratory Protection

The respiratory protection program for the Site is included as Attachment 1. As shown in Table 4, if sustained readings of organic vapors between 5 Vppm and 500 Vppm above background are recorded on the PID meter during intrusive work, Level C respiratory protection will be required. If sustained readings above 1,000 Vppm are recorded, all personnel will evacuate the exclusion zone until organic vapor readings drop below 1,000 Vppm above background. Engineering controls may be necessary to decrease the organic vapor readings.

Level C protection includes full-faced, air-purifying respirators equipped with a combination of cartridges for removing organic vapors, dusts, mists, and fumes. The following guidelines will be followed when using Level C respiratory protection:

- Air-purifying cartridges will be replaced at the end of each shift or when breakthrough occurs.

- Only employees who have had a pre-issue qualitative fit test will be allowed to work under Level C respiratory protection.

- Only employees who have passed a medical examination, including a pulmonary function test, will be allowed to use Level C respiratory protection.

- Excessive facial hair (e.g., beards) that prohibits a proper seal between the respirator and face will not be allowed.

If the On-Site PSO upgrades the personal protective equipment to Level B based on the conditions previously indicated, the following guidelines will be enforced:

- Only personnel qualified for self-contained breathing apparatus (SCBA) use will be allowed to work under Level B respiratory protection.

- Prior to using an SCBA, each employee will check his or her equipment, including: connections; valves; regulator; tank pressure (i.e., to ensure a minimum of 1,800 psi); backpack and harness assembly; cylinder and cylinder valve assembly; head and valve assembly; regulator and associated hoses; facepiece; and breathing tubes.

- Each SCBA unit will be cleaned after every use.

- Each SCBA unit will have a comprehensive maintenance check once each month.

- SCBA storage will be under the direction of the On-Site PSO. Each employee will be responsible for ensuring that the SCBA cylinder has been filled, the valves are clean, the straps are loosened, and the facepiece is properly protected before placing the unit in storage.

Level B respiratory protection will be required in areas where sustained readings on the PID in the breathing zone are within the range of 500 Vppm to 1,000 Vppm above background.

B. Dermal Protection/Protective Clothing

In addition to normal work clothes, at a minimum, the following protective clothing and equipment shall be worn by any personnel entering the exclusion zone or contamination reduction zone:

- A hard hat (when overhead equipment or structures are present);
- Disposable nitrile gloves; and
- Chemical-resistant, neoprene boots with steel toe and shank or latex overboots.

Any work involving an intrusive or sampling activity (e.g., soil sampling) or the handling of contaminated liquids or soils will require normal work clothes and at a minimum the following protective clothing:

- A hard hat;
- Safety goggles or a splash shield (unless full-faced respirators are required);
- Disposable nitrile inner gloves;

- Chemical-resistant outer gloves; and
- Chemical-resistant, neoprene boots with steel toe and shank or latex overboots.

Upgrading or downgrading protective equipment (addition of disposable Tyvek coveralls) will be the decision of the On-Site PSO and will be based on an assessment of the exposure potential determined from screening results obtained from the PID. Criteria for upgrading or downgrading to specific levels of protection; lists of equipment necessary for Levels B, C, and D; and related decontamination procedures are indicated in Attachment 2.

C. Protection from Physical Hazards

The physical hazards that will be present at ECC range from the naturally occurring (i.e., irregular terrain) to the use of heavy equipment, such as a drill rig or excavator. The safety concerns of all activities will be reviewed at the beginning of each workday during the safety session. The naturally occurring hazards related to slipping, tripping, or falling will primarily be a result of the topography of the Site and the materials that may be found on the ground surface. All personnel will be reminded that safety is their number one responsibility. Because the use of protective equipment will limit mobility and vision, each person will be instructed to pay special attention to his or her surroundings and to move with caution around the property.

The use of heavy equipment offers several special hazards that are primarily related to noise levels and the limited vision of the equipment operator. Ear plugs or hearing protectors will be used by personnel near heavy equipment in accordance with the Hearing Conservation Plan included as Attachment 3. While working in areas immediately adjacent to such equipment, each person will be responsible for ensuring that the equipment operator can see him or her, and that visual contact is confirmed by hand signals. In addition, each person will wear highly visible vests to decrease the risk of not being seen by an equipment operator.

D. Emergency Equipment

The following equipment will be kept on-site in the decontamination area:

- First-Aid Kit, and
- Emergency decontamination equipment (such as an eye wash station, extra Tyvek coveralls).

The following equipment will be kept at work areas:

- A portable eye wash unit, and
- Fire extinguisher (located by any machinery, such as drill rigs).

X. DECONTAMINATION PROCEDURES

Decontamination of equipment and personnel will be performed to prevent worker exposure to hazardous substances, to prevent cross contamination of samples, and to extend the useful life of safety equipment. All decontamination activities will be carried out within the contamination reduction zone, and any residuals generated (e.g., decontamination water, disposable gloves, or disposable Tyvek suits) will be placed in secure containers for disposal in accordance with local, state, and federal regulations.

A. Equipment

Equipment will be decontaminated by steam cleaning to remove any encrusted materials or residual contamination. Sampling tools (e.g., split-spoon samplers) will also be washed with a detergent, such as Alconox, and triple rinsed with deionized water. All steam cleaning, washing, and rinsing activities will be conducted within a designated decontamination area. Wastewaters will be removed from the sump with a wet vacuum or a submersible pump and placed in DOT-approved 55-gallon drums. All decontamination wastewater generated during the field activities will be stored on-site in drums and disposed of in accordance with all local, state, and federal regulations.

B. Personnel

Personnel decontamination will consist of soap and water washing to remove contaminants from reusable protective gear (e.g., neoprene boots, chemical-resistant gloves, and full-faced respirators). Disposable protective apparel will be removed in such a manner to prevent the spread of contaminants to other clothing (e.g., remove gloves by turning them inside out).

The detailed procedure for personnel decontamination will depend on the level of respiratory protection and dermal protection required for each specific work task. The general sequence of decontamination and removal of protective apparel based on Level C respiratory protection (air-purifying respirators and full-splash protection) is discussed in Attachment 2 (taken from the USEPA's Standard Operating Safety Guides). Decontamination procedures for Level B are also included in Attachment 2. The extent of washing required or modifications to the sequence will be specified by the On-Site PSO.

XI. EMERGENCY PROCEDURES

This HSP has been established to allow field work related to the till water extraction performance testing, and at ECC without adverse effects on worker health and safety. In addition, emergency response procedures have been developed to cover extraordinary conditions that may occur at the Site.

If an emergency occurs, the On-Site PSO will notify the appropriate emergency agency and take charge of the situation until the local fire department or other emergency agency responds. At that point, the On-Site PSO will offer technical assistance to the extent possible by identifying the hazardous substances or conditions present, and addressing, as appropriate, the use of emergency controls, maximum exposure limits, hazardous substance handling, and new technologies for mitigating the hazard or hazards present. After the hazard has been mitigated, the response activities will be critiqued, and, if necessary, the HSP will be modified.

A. Worker Injury

The On-Site PSO and other personnel working at the site have received first aid and cardiopulmonary resuscitation (CPR) training. If an individual becomes ill or is physically injured during the performance of field work, first aid will be administered and assistance will be sought. The following subsections outline the procedure to be followed in the event of a medical problem or emergency.

1. Decontamination

Any person who becomes ill or injured in an exclusion zone must be decontaminated to the degree practical, giving due consideration to which risk will be greater: the spread of contamination or the health of the individual. If the injury or illness is minor, full decontamination will be completed prior to transport.

2. Transport - Hospital or Clinic

Employees being transported to a clinic or hospital for treatment will take with them information concerning the chemical(s) to which they have been exposed and their own medical history. This information will be kept on site at the decontamination facility. Any vehicle used to transport contaminated personnel will be tested and cleaned, if so requested.

3. First Aid Procedures

If an employee working in a contaminated area becomes ill or is physically injured, general first aid procedures will be administered. Depending on the severity of

the injury, emergency medical attention may be sought. If the employee can be moved, he or she will be taken to the support zone. Decontamination procedures, additional first aid, or preparation for transportation will be performed in this zone.

If the injury to the worker is chemical in nature or related to the physical hazards previously identified, appropriate first aid procedures will be instituted as follows:

- Eye Exposure: If contaminated materials enter a worker's eyes, the materials will be washed out by using a 15-minute eye wash kit that will be kept at the site. Medical attention will be sought immediately.

- Skin Exposure: If skin irritation results from dermal contact with contaminated materials, the affected area will be washed with a mild soap or detergent and rinsed with water for at least 15 minutes. Medical attention will be sought if irritation in the affected area persists.

- Ingestion: If contaminated materials are ingested, vomiting should not be induced. Medical attention will be sought immediately.

- Inhalation: If an employee is overcome by fumes from chemical hazards, he or she will be moved to an area of fresh air. Medical attention will be sought.

- Hypothermia: If an employee suffers from hypothermia, medical attention will be sought immediately. The employee will be moved out of the cold and into warm clothing. Warming should take place slowly; no food or beverage will be administered.

- Frostbite: An employee suffering from frostbite will be moved to a warm area. Frostbitten areas of the body will be placed in warm (100 to 105° F) water, NOT hot water. Areas of concern will be handled gently and will not be rubbed or massaged. If toes or fingers are affected, gauze will be placed between them after warming them. The injured parts will be loosely bandaged. If the part has been thawed and refrozen, it should be rewarmed at room temperature. Medical assistance will be sought.

- Heat Stroke: If an employee suffers a heat stroke, medical attention will be sought immediately. The employee will be moved out of the heat and into a cooler area. The employee will be cooled as quickly as possible by immersing him or her in a cool bath, or wrapping wet sheets around the body. While waiting for an ambulance to arrive, the employee should be watched for symptoms of shock. Nothing should be given by mouth.

- Heat Exhaustion: If an employee suffers from heat exhaustion, he or she will be moved out of the heat and into a cooler place. The employee will lie down with his or her feet up. Clothing will be removed or loosened, and cold packs, wet towels, or sheets will be used to cool the skin. One-half glass of water should be administered every 15 minutes if the employee is fully conscious and can tolerate it. During all of these procedures, the employee will be observed for symptoms of shock. If the employee has not recovered within a half hour, or if the employee's condition worsens, medical attention will be sought.

4. Record Keeping

Exposure or the potential exposure of on-site workers during an emergency will be recorded on the Incident Safety Check-Off List (see Figure 4) and in the On-Site PSO's field notebook.

5. Accident Reporting

In the event of a reportable accident, an Accident Report Form shall be filled out by the On-Site PSO or the Site Supervisor (see Figure 5). All accidents shall be reported to the PSO and the ECC Trust as soon as practical. The PSO shall provide a copy of an updated OSHA 300 Log to the Project Coordinator within 6 days of a new case being entered on the log.

B. Fires

1. Localized Fires

If a localized fire breaks out, dry chemical (10-pound ABC) fire extinguishers will be used to bring the fire under control. Fire extinguishers will be located in the decontamination area and at each work area. If it is safe and feasible to do so, employees may:

- Use fire extinguishers to control or extinguish the fire.
- Remove or isolate flammable or other hazardous materials that may contribute to the fire.
- Extinguish other ignitable sources.
- Place soil or other inert material on the burning area to extinguish the fire.

If appropriate, local fire fighting authorities and other necessary response agencies will be contacted for notification and/or assistance. The On-Site PSO will immediately evacuate the area and take charge of the situation until the fire department responds. At that time, the On-Site PSO will advise the fire department of the location of the fire and the type of hazardous materials present. The On-Site PSO will offer additional technical assistance, as appropriate. The On-Site PSO will notify the Project Coordinator after taking emergency action.

2. Uncontrolled Fires

If an uncontrolled fire develops that may release potentially toxic gases, all persons in the immediate vicinity will be evacuated. The local fire department and other necessary response agencies will be called immediately and notified of the fire and materials involved. Evacuation of local residents, if required, will be the responsibility of the local police, who will be notified of the emergency and the potential effect on the local community. The On-Site PSO will take charge of the situation until the fire department responds. At that time, the On-Site PSO will offer technical assistance, as appropriate, and notify the Project Coordinator.

C. Spills

The On-Site PSO will be responsible for supervising the cleanup of minor spills. Spilled solids will be cleaned up and loaded in DOT-approved 55-gallon drums for subsequent disposal. Liquid spills will be solidified with absorbent material, which will be stored in the decontamination area, and loaded in DOT-approved 55-gallon drums for subsequent disposal. Transportation and disposal of any spill clean-up residual will be in accordance with all local, state, and federal requirements.

In the event of a significant spill of hazardous waste or materials, the On-Site PSO will immediately evacuate the area and notify the local fire department. Other necessary emergency response agencies will also be notified. The On-Site PSO will take charge of the situation until the fire department responds. At that time, the On-Site PSO will advise the fire department of the location of the spill, the type of hazardous materials present, and additional technical data, as

appropriate. If a spill occurs, the following actions, at a minimum, shall be taken by the On-Site PSO:

1. Notify the Project Coordinator.

2. Take immediate measures to control and contain the spill within the site boundaries.

3. Keep unnecessary people away, isolate the hazardous area, and deny entry.

4. Stay upwind, keep out of low lying areas.

5. Allow no flares, smoking, or flames in hazard area.

6. For liquids, keep combustibles away from the spilled material.

7. Small Dry Spills: Shovel contaminated materials into dry containers and cover; label containers as to contents.

8. Small Liquid Spills: Absorb with sand, clean fill, or other noncombustible absorbent material. Place contaminated material in a container, cover, and label it.

9. All tools and equipment used in the clean-up activity must be decontaminated before subsequent use. Contaminated material such as sorbent booms, rags, soil, or wood must be containerized.

The National Response Center, IDEM and USEPA will be notified if a reportable spill occurs.

D. Evacuation Plan

If an emergency necessitates evacuating field personnel, the On-Site PSO will notify the field team leader, and an appropriate signal for site evacuation will be given. All available vehicles located outside the exclusion zone will be used in the evacuation. Whenever possible, vehicles shall be parked in a manner that would effect speedy evacuation (back in). All personnel will exit the site and meet at a nearby rendezvous point established during the initial field work. The designated rendezvous points, which will be based on the downwind toxic corridor, will be posted at the decontamination facilities (see Figure 6). The evacuation route within the site will depend on which direction affords the most

direct route away from the hazard necessitating the evacuation. The On-Site PSO will update and verify the evacuation routes and rendezvous locations during the field work at the site, if necessary.

The visitor and employee logs will be used to ensure that all individuals are accounted for during an emergency situation. The On-Site PSO will be responsible for maintaining these daily sign-in/sign-out sheets (see Figure 7). If possible, personnel should exit the site through the contamination reduction zone and doff personal protective equipment in the required manner. Otherwise, decontamination procedures will be performed as required and as feasible after all personnel have exited the Site. Evacuation of the local community, if necessary, will be the responsibility of the local police or fire departments.

TABLES

TABLE 1

Exposure Limits and Recognition Qualities
Enviro-Chem Superfund Site
Zionsville, Indiana

Compound	OSHA PEL[1]	NIOSH REL[2]	IDLH[3]	STEL[4]	TLV[5]	Recognition Qualities		
						Color	Odor	State
Voltaile Organic Compounds:								
Acetone	1,000 ppm	250 ppm	2,500 ppm			colorless	mint-like	liquid
1,1-Dichloroethene	none	Ca[6]			5 ppm	colorless	sweet, chloroform-like	liquid
1,2-Dichloroethene (total)	200 ppm	200 ppm	1,000 ppm		200 ppm	colorless	acrid, chloroform-like	liquid
Ethylbenzene	100 ppm	100 ppm	800 ppm	125 ppm	100 ppm	colorless	Aromatic	liquid
Methylene chloride	25 ppm	Ca[6]	Ca 2,300 ppm[7]		50 ppm[8]	colorless	chloroform-like	liquid (gas above 104° F)
Methyl ethyl ketone	200 ppm	200 ppm	3,000 ppm	300 ppm		colorless	mint-like	liquid
Methyl isobutyl ketone	100 ppm	50 ppm	500 ppm	75 ppm		colorless	mild, pleasant	liquid
Tetrachloroethene (Tetrachloroethylene/Perchloroethylene)	100 ppm	Ca[6]	150 ppm[7]	100 ppm	25 ppm[8]	colorless	mild, chloroform-like	liquid
Toluene	200 ppm	100 ppm	500 ppm		50 ppm	colorless	sweet, pungent, benzene-like	liquid
1,1,1-Trichloroethane	350 ppm	350 ppm	700 ppm	450 ppm	350 ppm	colorless	mild, chloroform-like	liquid
Trichloroethylene (Trichloroethene)	100 ppm	Ca[6]	Ca 1,000 ppm[7]	100 ppm	50 ppm	colorless (unless dyed blue)	chloroform-like	liquid
Xylenes	100 ppm	100 ppm	900 ppm	150 ppm	100 ppm	colorless	aromatic	liquid (solid below 56° F)
Vinyl chloride	1 ppm	Ca[6]			1 ppm	colorless	mild, pleasant	gas

TABLE 1

Exposure Limits and Recognition Qualities
Enviro-Chem Superfund Site
Zionsville, Indiana

Compound	OSHA PEL[1]	NIOSH REL[2]	IDLH[3]	STEL[4]	TLV[5]	Recognition Qualities		
						Color	Odor	State
Semivolatile Organic Compounds:								
Bis(2-ethylhexyl)phthalate	5 mg/m^3	5 mg/m^3	5,000 mg/m^3		5 mg/m^3	colorless	slight	oily liquid
1,2-Dichlorobenzene (o-Dichlorobenzene)	50 ppm	50 ppm	200 ppm	50 ppm	25 ppm	colorless to pale yellow	pleasant, aromatic	liquid
di-n-butyl phthalate	5 mg/m^3	5 mg/m^3	4,000 mg/m^3		5 mg/m^3	colorless to faint yellow	slight aromatic	oily liquid
Diethyl phthalate	none	5 mg/m^3	none			colorless to white	slight aromatic	oily liquid
Isophorone	25 ppm	4 ppm	200 ppm			colorless to white	peppermint-like	liquid
Naphthalene	10 ppm	10 ppm	250 ppm	15 ppm		colorless to brown	moth ball-like	solid
Phenol	5 ppm	5 ppm	250 ppm			colorless to light pink	sweet/acrid	solid
Polychlorinated biphenyls	0.5 mg/m^3	0.001 mg/m^3	0.5 mg/m^3			colorless to pale yellow	mild hydrocarbon	viscous liquid

TABLE 1

Exposure Limits and Recognition Qualities
Enviro-Chem Superfund Site
Zionsville, Indiana

Key:

Blank Space	=	No information available in the source material.
Ca	=	Potential human carcinogen

Sources:

1. U.S. Department of Health and Human Services, Public Service. June 1997. *NIOSH Pocket Guide to Chemical Hazards.*

2. American Conference of Governmental Industrial Hygienists. *1999 Threshold Limit Value for Chemical Substances and Physical Agents and Biological Exposure Indices.*

Notes:

(1) Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) are time-weighted average (TWA) concentrations that must not be exceeded during any eight-hour work shift of a 40-hour week.

(2) National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs) are TWA concentrations for up to a 10-hour workday during a 40-hour work week.

(3) Immediately Dangerous to Life or Health (IDLH) concentrations represent the maximum concentrations from which a person could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

(4) A short-term exposure limit (STEL) is a 15-minute TWA exposure that should not be exceeded at any time during the work day.

(5) A threshold limit value (TLV), as published by the American Conference of Governmental Industrial Hygienists (ACGIH), is an eight-hour TWA exposure limit.

(6) NIOSH-identified occupational carcinogen-reduce exposure to lowest feasible concentration.

(7) The IDLH concentration or designation shown after Ca was determined in the NIOSH Standards Completion Program, and carcinogenic effects were not considered.

(8) Suspected human carcinogen according to the ACGIH.

TABLE 2

Symptoms of Overexposure, Potential Chronic Effects, and First Aid Treatment
***Enviro-Chem* Superfund Site**
Zionsville, Indiana

Compound	Symptoms of Overexposure	Target Organs	First Aid Treatment
Volatile Organic Compounds:			
Acetone	Irritation of eyes, nose and throat, headache, dizziness, depression of central nervous system, dermatitis	Eyes, skin, respiratory system, central nervous system	Eye: Irrigate immediately Skin: Flush with water immediately Breath: Respiratory support Swallow: Medical attention immediately
1,1-Dichloroethene	Irritation of eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney dysfunction; pneumonitis; potential occupational carcinogen	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
1,2-Dichloroethene (total)	Irritation of eyes, respiratory system; central nervous system depressant/depression	Eyes, respiratory system, central nervous system	Eye: Irrigate immediately Skin: Water flush promptly Breath: Respiratory support Swallow: Medical attention immediately
Ethylbenzene	Irritation of eyes, mucous membrane; headache; dermatitis; narcosis, coma	Eyes, upper respiratory system, skin, central nervous system	Eye: Irrigate immediately Skin: Water flush promptly Breath: Respiratory support Swallow: Medical attention immediately
Methylene chloride	Irritation of eyes, skin; fatigue, weakness, somnolence (sleepiness, unnatural drowsiness), lightheadedness; numbness, tingle limbs; nausea; potential occupational carcinogen	Skin, central nervous system, eyes, cardiovascular system	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
Methyl ethyl ketone	Irritation of eyes, skin and nose, headache, dizziness, vomiting, dermatitis	Eyes, skin, respiratory system, central nervous system	Eye: Irrigate immediately Skin: Flush with water immediately Breath: Promote fresh air Swallow: Medical attention immediately
Methyl isobutyl ketone	Irritation of eyes and nose, peripheral neuropathy, weakness, exhaustion, paresthesia, dermatitis, headache, drowsiness	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Eye: Irrigate immediately Skin: Wash with soap immediately Breath: Respiratory support Swallow: Medical attention immediately

TABLE 2

Symptoms of Overexposure, Potential Chronic Effects, and First Aid Treatment
Enviro-Chem Superfund Site
Zionsville, Indiana

Compound	Symptoms of Overexposure	Target Organs	First Aid Treatment
Volatile Organic Compounds (continued):			
Tetrachloroethene (Perchloroethylene/ Tetrachloroethylene)	Irritation of eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; vertigo (an illusion of movement), dizziness, incoordination; headache, somnolence (sleepiness, unnatural drowsiness); skin erythema (skin redness); liver damage; potential occupational carcinogen	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
Toluene	Irritation of eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); nervousness, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
1,1,1-Trichloroethane	Irritation of eyes, skin; headache; lassitude (weakness, exhaustion); depression; poor equilibrium; dermatitis; cardiac arrhythmia; liver damage	Eyes, skin, central nervous system, cardiovascular system, liver	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
Trichloroethylene (Trichloroethene)	Irritation of eyes, skin; headache; vertigo (an illusion of movement); visual disturbance; fatigue, giddiness; tremor; somnolence (sleepiness, unnatural drowsiness); nausea, vomiting; dermatitis; cardiac arrhythmia, paresthesia; liver injury; potential occupational carcinogen	Eyes, skin, respiratory system, cardiovascular system, liver, kidneys, central nervous system	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
Vinyl chloride	Weakness; abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; potential occupational carcinogen	Liver, central nervous system, blood, respiratory system, lymphatic system	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
Xylenes	Irritation of eyes, skin, nose, throat; dizziness; excitement; drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia; nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately

TABLE 2

Symptoms of Overexposure, Potential Chronic Effects, and First Aid Treatment
Enviro-Chem Superfund Site
Zionsville, Indiana

Compound	Symptoms of Overexposure	Target Organs	First Aid Treatment
Semivolatile Organic Compounds:			
Bis(2-ethylhexyl)phthalate	Irritation of eyes, mucous membrane; in animals: liver damage; teratogenic effects; potential occupational carcinogen	Eyes, respiratory system, central nervous system, liver, reproductive system, gastrointestinal tract	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately
1,2-Dichlorobenzene (o-Dichlorobenzene)	Irritation of eyes, nose; liver, kidney damage; skin blisters	Eyes, skin, respiratory system, liver, kidneys	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
di-n-butyl phthalate	Irritation of eyes, upper respiratory system, stomach	Eyes, respiratory system, gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Medical attention immediately
Diethyl phthalate	Irritation of eyes, skin, nose and throat, headache, dizziness, nausea, discharge of tears, polyneuropathy, vestibular dysfunction, pain, numbness, weakness, exhaustion, spasms in arms/legs	Eyes, skin, respiratory system, central nervous system, reproductive system	Eye: Irrigate immediately Skin: Wash regularly Breath: Respiratory support Swallow: Medical attention immediately
Isophorone	Irritation of eyes, nose and throat, headache, nausea, dizziness, weakness, exhaustion, narcosis, malaise, dermatitis	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Eye: Irrigate immediately Skin: Wash with soap immediately Breath: Respiratory support Swallow: Medical attention immediately
Napthalene	Irritation of eyes, headache, confusion, excitement, malaise, nausea, vomiting, abdominal pain, irritation of bladder, profuse sweating, jaundice, hematuria, renal shutdown, dermatitis, optical neuritis, corneal damage	Eyes, skin, blood, liver, kidneys, central nervous system	Eye: Irrigate immediately Skin: Wash with soap immediately Breath: Respiratory support Swallow: Medical attention immediately
Phenol	Irritation of eyes, nose and throat, anorexia, weakness, exhaustion, muscle aches and pain, dark urine, cyanosis, liver/kidney damage, skin burns, dermatitis, ochronosis, tremors/convulsions/ twitches	Eyes, skin, respiratory system, liver, kidney	Eye: Irrigate immediately Skin: Wash with soap immediately Breath: Respiratory Support Swallow: Medical attention immediately

TABLE 2

Symptoms of Overexposure, Potential Chronic Effects, and First Aid Treatment
Enviro-Chem Superfund Site
Zionsville, Indiana

Compound	Symptoms of Overexposure	Target Organs	First Aid Treatment
Polychlorinated biphenyls	Irritation to eyes, chloracne, liver damage, reproductive effects, potential occupational carcinogen	Eyes, skin, liver, reproductive system	Eye: Irrigate immediately Skin: Wash with soap immediately Breath: Respiratory support Swallow: Medical attention immediately

Source:

U.S. Department of Health and Human Services, Public Health Service. June 1997. *NIOSH Pocket Guide to Chemical Hazards.*

TABLE 3

Degree of Exposure for Identified Potential Hazards
Enviro-Chem Superfund Site
Zionsville, Indiana

Task	Hazard[1]	Pathway of Exposure	Potential for Exposure[2]	Comment
Thin Barrier Curtain Wall Installation	Chemical: VOCs, SVOCs	Dermal: contact with contaminated soils or water	High	See Tables 5 and 7 for the appropriate preventive and protective measures, respectively. Follow the HSP hazard monitoring protocols on Table 4 and the respiratory program.
	Chemical: organic vapors	Respiratory: inhalation	High	
	Chemical: VOCs, SVOCs	Ingestion	Moderate	
	Physical injury	Falling, slipping, tripping, electrocution, falling objects, bodily injury, vehicle accidents, rollovers, fire, noise	Moderate	
	Biological injury	Stings, bites (especially snakes), exposure to poison ivy	Low	

Task	Hazard[1]	Pathway of Exposure	Potential for Exposure[2]	Comment
Piezometer Installation (includes water level measurement)	Chemical: VOCs, SVOCs	Dermal: contact with contaminated soil and ground water	High	See Tables 5 and 6 for appropriate preventive and protective measures, respectively. Follow the HSP hazard monitoring protocols on Table 4 and the respiratory protection program.
	Chemical: organic vapors, dust	Respiratory: inhalation	Moderate	
	Chemical: VOCs, SVOCs, metals, PCBs	Ingestion	Low	
	Physical injury	Falling, slipping, tripping, electrocution, falling objects, bodily injury, vehicle accidents, rollovers, fire, noise	Moderate	
	Biological injury	Stings, bites, exposure to poison ivy	Low	

TABLE 3

Degree of Exposure for Identified Potential Hazards
Enviro-Chem Superfund Site
Zionsville, Indiana

Task	Hazard[1]	Pathway of Exposure	Potential for Exposure[2]	Comment
Non-Intrusive Activities	Chemical: VOCs, SVOCs	Dermal: contact with contaminated soil	Low	See Tables 5 and 8 for the appropriate preventive and protective measures, respectively. Follow the HSP hazard monitoring protocols on Table 4 and the respiratory program.
	Chemical: organic vapors	Respiratory inhalation	Low	
	Chemical: VOCs, SVOCs, metals	Ingestion	Low	
	Physical injury	Falling, slipping, tripping, noise, fire, electrocution, falling objects, bodily entanglement, vehicle accidents, rollovers	Low	
	Biological injury	Stings, bites, poison ivy	Low	

Key:

VOC = Volatile organic compound
SVOC = Semivolatile organic compound
RI/FS = Remedial Investigation/Feasibility Study
HSP = Health and Safety Plan

Notes:

(1) Chemical, physical, and biological hazards that have been identified during the hazard analysis.
(2) On-site worker's potential for exposure to the identified hazard if the worker does not implement the protective measures prescribed by this HSP.

TABLE 4

Hazard Monitoring
Enviro-Chem Superfund Site
Zionsville, Indiana

Hazard	Monitoring Method or Instrument	Action Level[1]	Protective Measures
Organic Vapors	Photoionization Detector (PID) Thermo Environmental Instruments Model 580B, or Equivalent	Background to 5 Vppm sustained readings above background	Level D - No respiratory protection needed
		5 Vppm to 500 Vppm sustained readings above background	Level C - Full-face respirator with organic vapor cartridges
		500 Vppm to 1,000 Vppm sustained readings above background	Level B - Self-contained breathing apparatus
		Above 1,000 Vppm	Evacuate exclusion zone

Note:

[1] The indicated action levels are for sustained readings above background taken within the breathing zone.

TABLE 5
Reduction of Hazard Exposure
Enviro-Chem Superfund Site
Zionsville, Indiana

Task	Engineering Control		Work Practice	
	Type	Evaluation	Type	Evaluation
Thin Barrier Curtain Wall Installation	Site zoning	Work will be performed within the exclusion zone	Remove all nonessential workers	Only workers performing this task will be present in the work area
	Site characterization	Development of the HSP	Wet down dusty operation. De-energize and temporarily move electric line	NA
	Dikes	Use dikes or other barriers to avoid releases of liquids to Unnamed Ditch	Keep workers upwind	Workers will stay upwind of active areas whenever possible
	Ventilation	NA	Non-entry into confined spaces	NA
	Remote equipment	Non-explosive; air hazard does not warrant its use	Monitoring of worker breathing zone	HSP Air Monitoring Program
	Pressurized cabs	NA	Minimize time in the exclusion zone	Site Supervisor will instruct workers on task implementation before entering exclusion zone

Task	Engineering Control		Work Practice	
	Type	Evaluation	Type	Evaluation
Piezometer Installation (includes water level measurements)	Site zoning	Work will be performed within the exclusion zone	Remove all nonessential workers	Only workers performing this task will be present in the work area
	Site characterization	Development of the HSP	Wet down dusty operations	NA
	Dikes	NA	Keep workers upwind	Workers will stay upwind of piezometers whenever possible
	Ventilation	NA	Non-entry into confined spaces	NA
	Remote equipment	NR – non-explosive; air hazard does not warrant its use	Monitor worker breathing zone	HSP Air Monitoring Program
	Pressurized cabs	NA	Minimize time in the exclusion zone	Site Supervisor will instruct workers on task implementation before entering exclusion zone

TABLE 5
Reduction of Hazard Exposure
Enviro-Chem Superfund Site
Zionsville, Indiana

Task	Engineering Control		Work Practice	
	Type	**Evaluation**	**Type**	**Evaluation**
Non-Intrusive Activities	Site zoning	Visitors and inspectors will be informed of the location of work zone boundaries and the related restrictions	Remove all nonessential workers	Visitors will not be allowed in active work areas
	Site characterization	Development of the HSP	Wet down dusty operations	NA
	Dikes	NA	Keep workers upwind	Visitors will stay upwind of active areas
	Ventilation	NA	Non-entry into confined spaces	NA
	Remote equipment	NR – non-explosive; air hazard does not warrant its use	Monitor worker breathing zone	NA
	Pressurized cabs	NA	Minimize time in the exclusion zone	Visitors will only be admitted in the exclusion zone during periods of minimal activity for minimal lengths of time

Key:

NA = Not applicable
NR = Not required
RI/FS = Remedial Investigation/Feasibility Study
HSP = Health and Safety Plan

TABLE 6

Potential Hazards, Equipment, and Protective Measures for Piezometer Installation
Enviro-Chem Superfund Site
Zionsville, Indiana

Item	Description
Potential Hazards[1]	Exposure to contaminated soil, fugitive dust, organic vapors, noise, fire, electrocution, falling objects, bodily entanglement, vehicle accidents, rollovers, falling, tripping, and slipping.
Equipment	**General Equipment Requirements:** Drilling rig, all-terrain vehicles for transporting large pieces of equipment, pick-up trucks, drums, a large supply of water, and a PID meter. **Worker PPE[2]:** A hard hat; Tyvek coveralls; disposable inner gloves; chemical-resistant outer gloves; chemical-resistant boots with boot covers, safety glasses; hearing protection if required by the Hearing Conservation Plan (Attachment 3); and a respirator or SCBA, if required by the Health and Safety Plan's respiratory protection program (Section VIII and Attachment 1), hazard monitoring action levels (Table 4), and air monitoring results.
Protective Measures[3]	**Worker Standards:** Workers must: (1) remain physically fit by obtaining sufficient rest and maintaining a proper diet as well as good physical and mental health, (2) know their jobs and the associated duties, and (3) remain alert and keep their minds on their jobs. Employees must wear proper clothing for the job, including a hard hat, at all times. Several layers of thin clothing are better than thick or heavy clothes. Loose or flopping clothing that may hang or be caught in moving machinery cannot be worn at the site. Employees must wear the safety shoes required and gloves without gauntlets or large open cuffs. Work cannot be performed by an employee in wet clothing. New crew members must be encouraged to adopt safe working practices. Any hazards around the drill rig that should be especially watched must be pointed out by a supervisor. Each new crew member must receive instructions, must have read and understood the Health and Safety Plan, and must understand all of the necessary safety protocols before he or she starts work. **Work Activities:** All work activities must be completed in a safe manner, and any unsafe condition or practice must be reported to an employee's supervisor and the On-Site PSO.

TABLE 6

Potential Hazards, Equipment, and Protective Measures for Piezometer Installation
Enviro-Chem Superfund Site
Zionsville, Indiana

Item	Description
Protective Measures[3] (continued)	**Work Activities (continued):** Each crew member must inspect the premises where he or she is to work when the employee goes on duty to ensure that everything is in a safe condition. Machinery and tools must be inspected for defects, and any necessary repairs or replacements must be completed before they are used at the site. Air in the work zone must be monitored continuously by a PID meter, and the Health and Safety Plan's respiratory protection program and the hazard monitoring action levels must be strictly followed. If, at the start of a new activity or phase of activity, there is a possibility of excessive noise, the On-Site PSO will be responsible for determining the need to implement the controls indicated in the Hearing Conservation Plan (Attachment 3). Good housekeeping must be practiced, and employees must keep their tools and equipment orderly. Before leaving the job, employees must place tools in the tool rack and clean up any scrap and debris. All unnecessary material must be removed from the working area, all flammable gases and oils must be properly stored in the appropriate containers, and all heating devices and open flames must be properly attended. **Equipment and Tools:** Safety devices and any other tools must be used as directed by the PSO. All tools and equipment, including a 10-pound ABC fire extinguisher, must be available and in operable condition. All safety devices must be in good working condition, and worn or defective tools must not be used and must be reported to the driller or supervisor. Any grease or oil must be inserted into machinery **only** through proper inlets and **only** when the equipment is **not moving**. Vehicle steps and work platforms must be kept free of grease, mud, and clutter. Ladders and stairs must be used as intended. Workers are not allowed to jump off the drill rig, pipe racks, trucks, etc. Workers must not walk under the drill pipe or casing when it is being hoisted overhead or laid down on racks.

Key:

PSO = Project Safety Officer
SCBA = Self-contained breathing apparatus
PID = Photoionization detector
PPE = Personal protection equipment

Notes:

(1) This list is not comprehensive; other hazards may exist.
(2) This list is not comprehensive; other personal protective equipment may be required.
(3) This list is not comprehensive; other protective measures may be necessary.

TABLE 7

Potential Hazards, Equipment, and Protective Measures for Thin Barrier Curtain Wall Installation
Enviro-Chem Superfund Site
Zionsville, Indiana

Item	Description
Potential Hazards[1]	Exposure to contaminated soil, fugitive dust, organic vapors, noise, fire, electrocution, heavy equipment, falling objects, bodily entanglement, vehicle accidents, rollovers, falling, tripping, and slipping.
Equipment	**General Equipment Requirements:** Excavation equipment, trenching equipment, all-terrain vehicles for transporting large pieces of equipment, pick-up trucks, pumping/mixing equipment, and a PID meter. **Worker PPE[2]:** A hard hat; Tyvek coveralls; disposable inner gloves; chemical-resistant outer gloves; chemical-resistant boots with boot covers, safety glasses; hearing protection if required by the Hearing Conservation Plan (Attachment 3); and a respirator or SCBA, if required by the Health and Safety Plan's respiratory protection program (Section VIII and Attachment 1), hazard monitoring action levels (Table 4), and air monitoring results.
Protective Measures[3]	**Worker Standards:** Workers must: (1) remain physically fit by obtaining sufficient rest and maintaining a proper diet as well as good physical and mental health, (2) know their jobs and the associated duties, and (3) remain alert and keep their minds on their jobs. Employees must wear proper clothing for the job at all times. Several layers of thin clothing are better than thick or heavy clothes. Employees must wear the required PPE. Work cannot be performed by an employee in wet clothing. New crew members must be encouraged to adopt safe working practices. Any hazards that should be especially watched must be pointed out by a supervisor. Each new crew member must receive instructions, must have read and understood the Health and Safety Plan, and must understand all of the necessary safety protocols before he or she starts work.

TABLE 7

Potential Hazards, Equipment, and Protective Measures for Thin Barrier Curtain Wall Installation
Enviro-Chem Superfund Site
Zionsville, Indiana

Item	Description
Protective Measures[3] (continued)	**Work Activities:** All work activities must be completed in a safe manner, and any unsafe condition or practice must be reported to an employee's supervisor and the On-Site PSO. Each crew member must inspect the premises where he or she is to work when the employee goes on duty to ensure that everything is in a safe condition. Tools must be inspected for defects, and any necessary repairs or replacements must be completed before they are used at the site. Air in the work zone must be monitored continuously by a PID meter, and the Health and Safety Plan's respiratory protection program and the hazard monitoring action levels must be strictly followed. If, at the start of a new activity or phase of activity, there is a possibility of excessive noise, the On-Site PSO will be responsible for determining the need to implement the controls indicated in the Hearing Conservation Plan (Attachment 3). Good housekeeping must be practiced, and employees must keep their tools and equipment orderly. Before leaving the job, employees must place tools in the tool rack and clean up any scrap and debris.
	Equipment and Tools: Safety devices and any other tools must be used as directed by the PSO.

Key:

PSO = Project Safety Officer
SCBA = Self-contained breathing apparatus
PID = Photoionization detector
PPE = Personal protection equipment

Notes:

(1) This list is not comprehensive; other hazards may exist.
(2) This list is not comprehensive; other personal protective equipment may be required.
(3) This list is not comprehensive; other protective measures may be necessary.

TABLE 8

Potential Hazards, Equipment, and Protective Measures for Non-Intrustive Activities[1]
Enviro-Chem Superfund Site
Zionsville, Indiana

Item	Description
Potential Hazards[2]	Exposure to contaminated soil, fugitive dust, organic vapors, noise, fire, electrocution, falling objects, bodily entanglement, vehicle accidents, rollovers, falling, tripping, and slipping.
Equipment	**General Equipment Requirements:** Field log book, other task-specific equipment, as necessary. **Worker PPE[3]:** A hard hat (when overhead equipment or structures are present), chemical-resistant boots with boot covers, and safety glasses.
Protective Measures[4]	**Worker Standards:** Workers must: (1) remain physically fit by obtaining sufficient rest and maintaining a proper diet as well as good physical and mental health, (2) know their jobs and the associated duties, and (3) remain alert and keep their minds on their jobs. Employees must wear proper clothing for the job at all times. Several layers of thin clothing are better than thick or heavy clothes. Loose or flopping clothing that may hang or be caught in moving machinery cannot be worn at the site. Employees must wear the safety shoes required. Work cannot be performed by an employee in wet clothing. New crew members must be encouraged to adopt safe working practices. Each new crew member must receive instructions, must have read and understood the Health and Safety Plan, and must understand all of the necessary safety protocols before he or she starts work. **Work Activities:** All work activities must be completed in a safe manner, and any unsafe condition or practice must be reported to an employee's supervisor and the On-Site PSO.

TABLE 8

Potential Hazards, Equipment, and Protective Measures for Non-Intrustive Activities[1]
Enviro-Chem Superfund Site
Zionsville, Indiana

Item	Description
Protective Measures[4] (continued)	**Work Activities (continued):** Each crew member must inspect the premises where he or she is to work when the employee goes on duty to ensure that everything is in a safe condition.

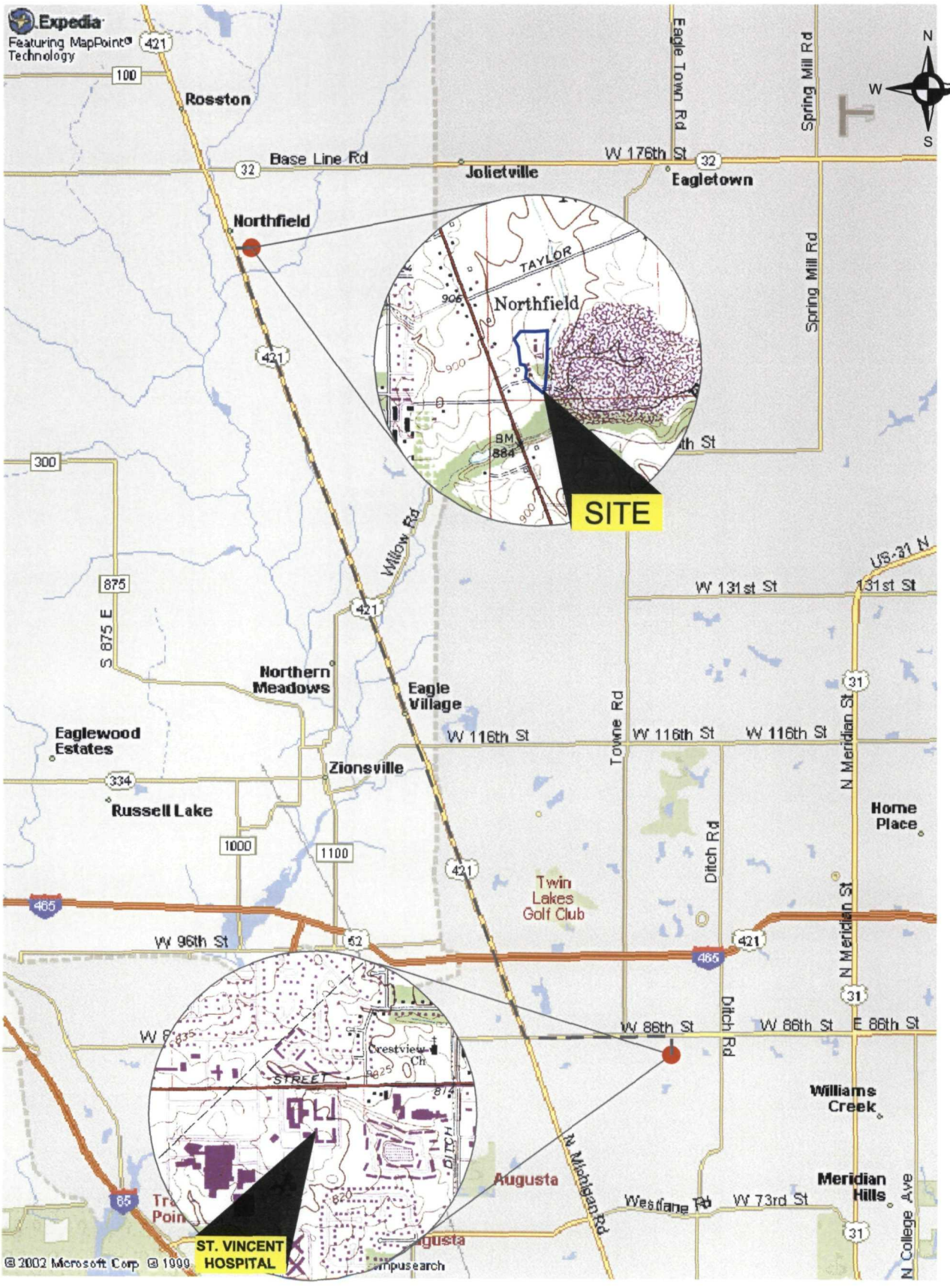
Key:

PSO = Project Safety Officer
SCBA = Self-contained breathing apparatus
PID = Photoionization detector
PPE = Personal protection equipment

Notes:

(1) On-site activities that are not covered in Tables 6 and 7 and do not alter the physical conditions of the site. This includes, but is not limited to, site surveys, walk-throughs, inspections, audits, and assessments.
(2) This list is not comprehensive; other hazards may exist.
(3) This list is not comprehensive; other personal protective equipment may be required.
(4) This list is not comprehensive; other protective measures may be necessary.

FIGURES



NOT TO SCALE

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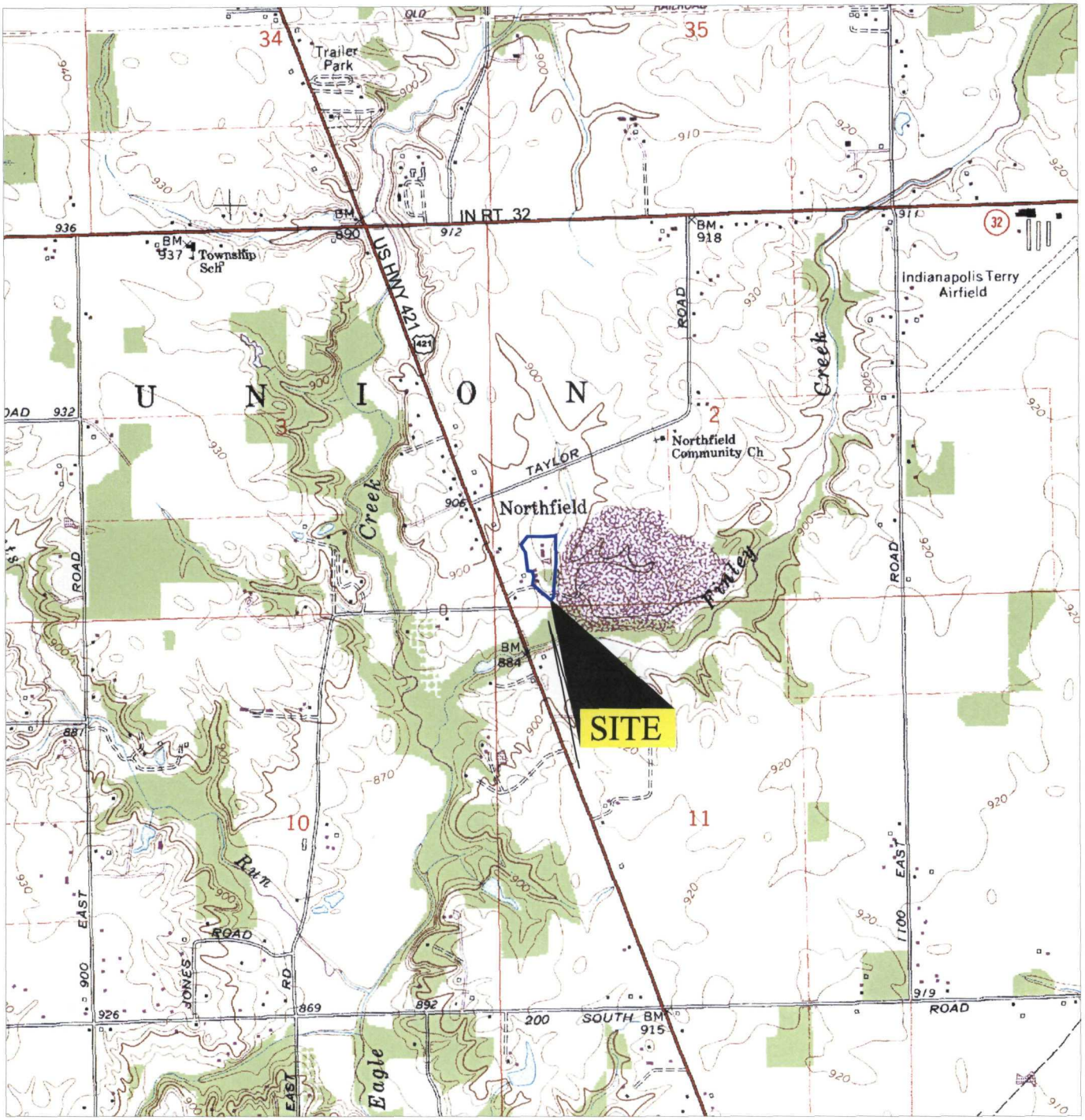
ENVIRON

EMERGENCY ROUTE TO HOSPITAL
ENVIRO-CHEM SUPERFUND SITE
ZIONSVILLE, INDIANA

Figure 1

Drafter:	APR	Date: 09/15/05	Contract Number:	21-6585K	Approved:	Revised:



SCALE 1:24000

1 1/2 0 1 MILE

2000 0 2000 4000 6000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SOURCE: U.S.G.S. 7.5 minute series (topographic)
Rosston, IN Quadrangle 1969; Photorevised 1987

ENVIRON

SITE LOCATION MAP
ENVIRO-CHEM SUPERFUND SITE
ZIONSVILLE, INDIANA

Figure
2

Drafter: APR Date: 09/15/05 Contract Number: 21-6585K Approved: Revised:

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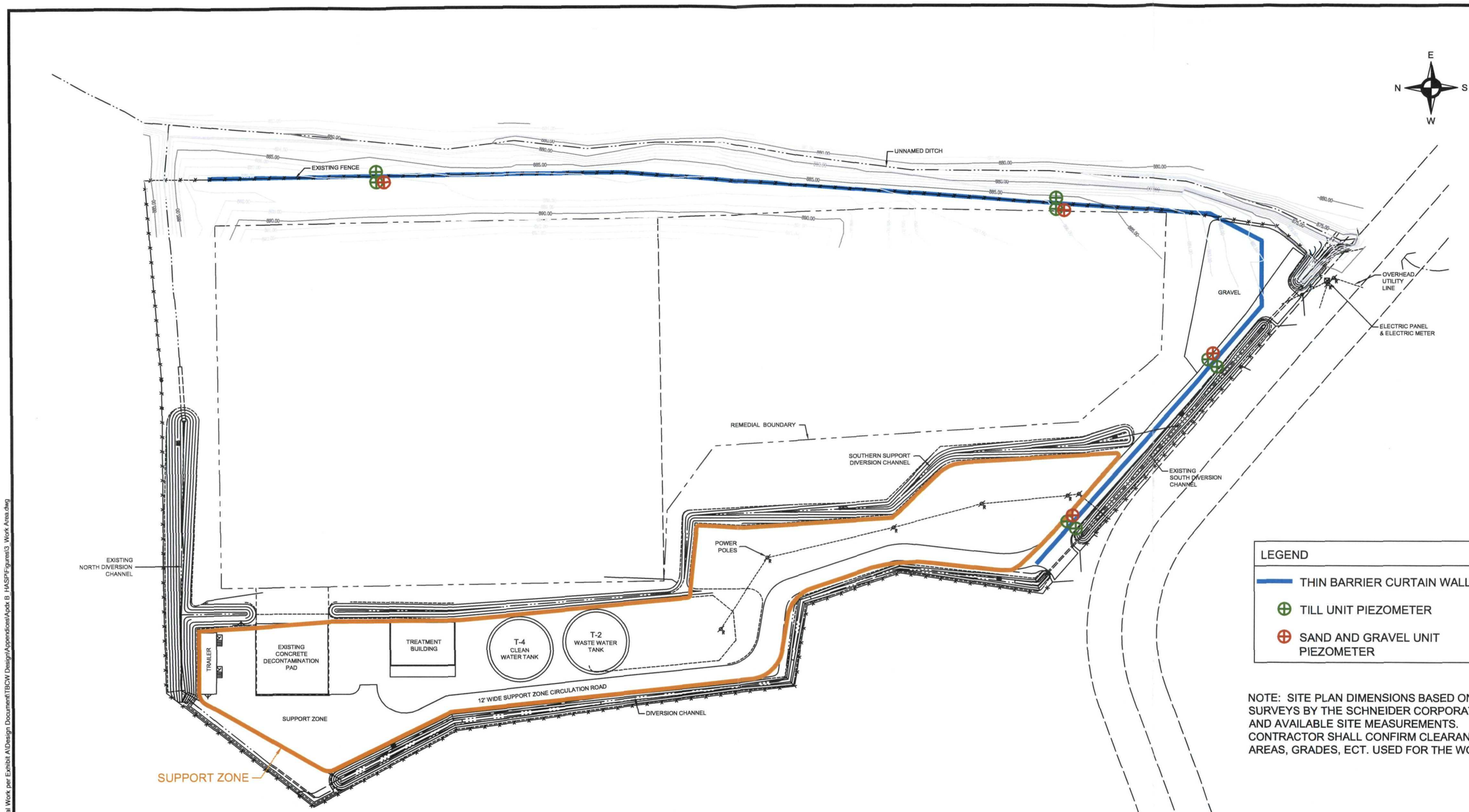

NOTE: SITE PLAN DIMENSIONS BASED ON SURVEYS BY THE SCHNEIDER CORPORATION AND AVAILABLE SITE MEASUREMENTS. CONTRACTOR SHALL CONFIRM CLEARANCES, AREAS, GRADES, ECT. USED FOR THE WORK.

ENVIRON

WORK AREAS: THIN BARRIER CURTAIN WALL AND PIEZOMETERS

ENVIRO-CHEM SUPERFUND SITE
ZIONSVILLE, INDIANA

DATE:	CONTRACT NUMBER:		FIGURE
09/15/05	21-6585K		3
DRAFTER: APR	APPROVED:	REVISED:	

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I. BEFORE FIELD ACTIVITY EMPLOYEE: _____

1. INCIDENT SITE _____ CITY _____ STATE _____
RESPONSE DATES

2. ACTIVITY DESCRIPTION: SITE EVALUATION ___ CONTAINMENT ___ WELL DRILLING ___ FACILITY INSPECTION ___
SAMPLING–AIR WATER ___ DRUM ___ SOIL ___ RESIDENTIAL ___ OTHER _____

3. TYPE OF RESPONSE: SPILL ___ FIRE ___ SITE ___ TRAIN _____ OTHER _____

4. SITE TOPOGRAPHY: MOUNTAINS ___ RIVERS ___ VALLEY ___ RURAL ___
SUBURBAN ___ LEVEL ___ SLOPES ___ UNKNOWN ___

5. INCIDENT SAFETY PLAN: REGION _____ REVIEWED _____
ERT _____ BRIEFED _____
FACILITY _____ NOT DEVELOPED _____

6. SITE ACCESSIBILITY: ROAD: GOOD ___ AIR: GOOD ___
FAIR ___ FAIR ___
POOR ___ POOR ___

7. SUSPECTED CHEMICAL(S) AND PATHWAY WITH SOURCE(S) INVOLVED: (A) _____
(B) _____ (C) _____ (D) _____

8. EMERGENCY RESPONSE TEAMS PRESENT FOR FIRST AID, ETC. YES _____ NO _____

9. PROTECTIVE LEVEL(S) SELECTED: (A) _____ (B) _____ (C) _____ (D) _____
(A) IF LEVEL "C" – 1. IDENTIFY CANISTER
(B) IF LEVEL "D" – JUSTIFY:

10. SCBA INDENTIFY BUDDY SYSTEM: OFFICE/NAME

11. LAST RESPONSE: (A) LEVEL USED: (A) _____ (B) _____ (C) _____ (D) _____
(B) MEDICAL ATTENTION/EXAM PERFORMED: YES _____ NO _____

II. AFTER RESPONSE

1. PROTECTIVE LEVEL USED: (A) _____ (B) _____ (C) _____ (D) _____
(A) IF LEVEL "C" – IDENTIFY CANISTER
(B) IF LEVEL "D" – JUSTIFY:
(C) LEVEL B OR C SKIN PROTECTION: (A) _____ (B) _____ (C) _____ (D) _____

2. LIST POSSIBLE CHEMICAL EXPOSURE: SAME AS ABOVE: (A) _____
(B) _____ (C) _____ (D) _____

3. EQUIPMENT DECONTAMINATION: (A) CLOTHING (B) RESPIRATOR (C) MONITORING
DISPOSED: _____ _____ _____
CLEANED: _____ _____ _____
NO ACTION: _____ _____ _____

4. APPROXIMATE TIME IN EXLUSION AREA _____ HOURS PER DAY FOR _____ DAYS

5. WAS MEDICAL ATTENTION/EXAM REQUIRED FOR THIS RESPONSE: YES _____ NO _____

PART I: DATE PREPARED: _____ REVIEWED BY _____ DATE _____
PART II: DATE PREPARED: _____ REVIEWED BY _____ DATE _____

ENVIRON

INCIDENT SAFETY CHECK-OFF LIST
ENVIRO-CHEM SUPERFUND SITE
ZIONSVILLE, INDIANA

Figure 4

Drafter: APR Date: 09/15/05 Contract Number: 21-6585K Approved: Revised:

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SUPERVISOR'S REPORT OF ACCIDENT	DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENTS

TO	FROM TELEPHONE (include area code)

NAME OF INJURED OR ILL EMPLOYEE

DATE OF ACCIDENT	TIME OF ACCIDENT	EXACT LOCATION OF ACCIDENT

NARRATIVE DESCRIPTION OF ACCIDENT

NATURE OF ILLNESS OR INJURY AND PART OF BODY INVOLVED	LOST TIME YES ☐ NO ☐

PROBABLE DISABILITY (check one)

FATAL	LOST WORK DAY WITH DAYS AWAY FROM WORK	LOST WORK DAY WITH DAYS OF RESTRICTED ACTIVITY	NO LOST WORK DAY	FIRST AID ONLY
☐	☐	☐	☐	☐

CORRECTIVE ACTION TAKEN BY REPORTING UNIT

CORRECTIVE ACTION THAT REMAINS TO BE TAKEN (by whom and by when)

NAME OF SUPERVISOR	TITLE
SIGNATURE	DATE

ENVIRON

ACCIDENT REPORT FORM
ENVIRO-CHEM SUPERFUND SITE
ZIONSVILLE, INDIANA

Figure 5

Drafter: APR | Date: 09/15/05 | Contract Number: 21-6585K | Approved: | Revised:

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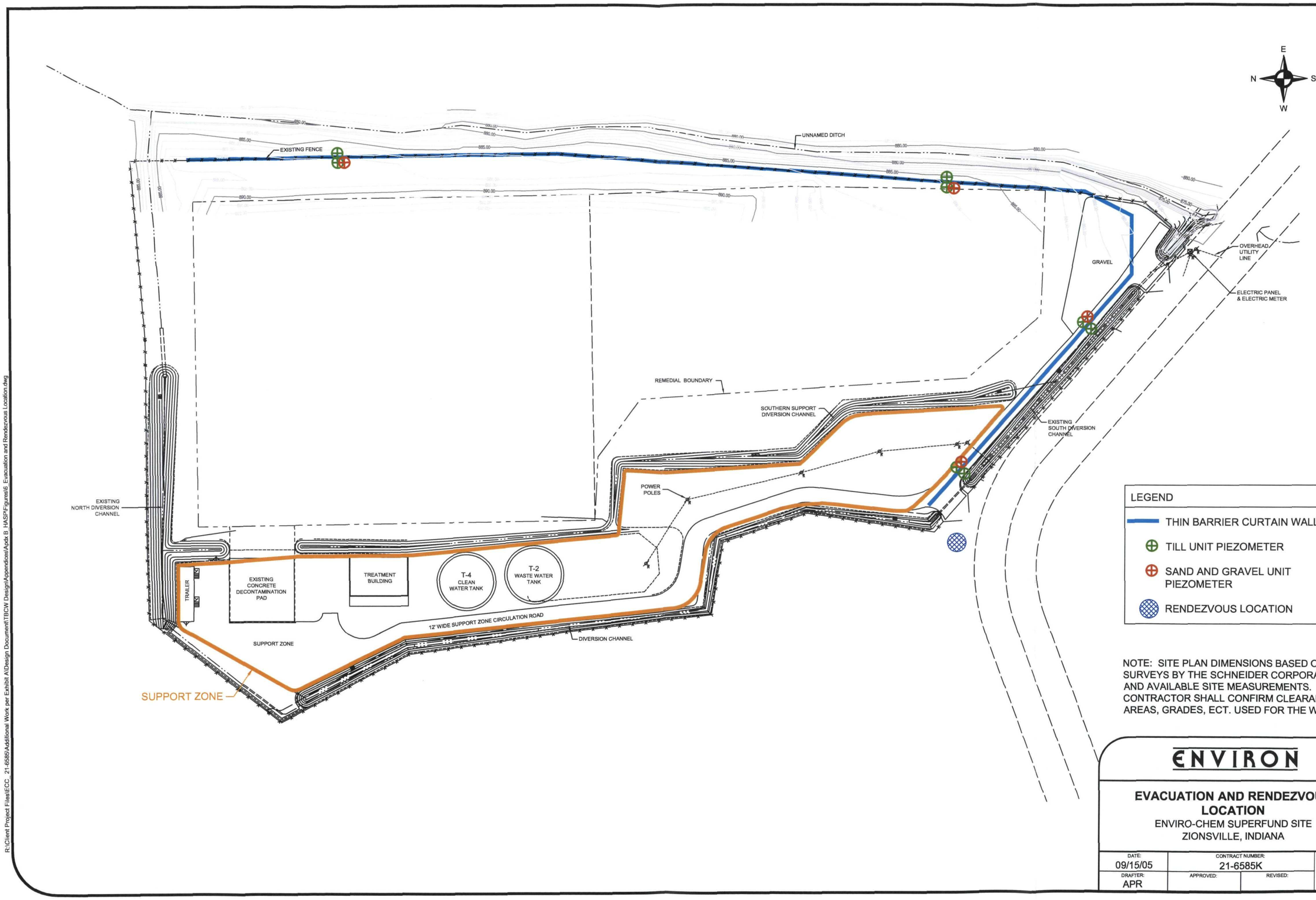

NOTE: SITE PLAN DIMENSIONS BASED ON SURVEYS BY THE SCHNEIDER CORPORATION AND AVAILABLE SITE MEASUREMENTS. CONTRACTOR SHALL CONFIRM CLEARANCES, AREAS, GRADES, ECT. USED FOR THE WORK.

ENVIRON

EVACUATION AND RENDEZVOUS LOCATION

ENVIRO-CHEM SUPERFUND SITE
ZIONSVILLE, INDIANA

DATE:	CONTRACT NUMBER:		FIGURE
09/15/05	21-6585K		6
DRAFTER: APR	APPROVED:	REVISED:	

R:\Client Project Files\ECC, 21-6585\Additional Work per Exhibit A\Design Document\TBCW Design\Appendices\Apdx B, HASP\Figures\6 Evacuation and Rendezvous Location.dwg

DATE	TIME IN	TIME OUT	NAME	COMPANY

ENVIRON

VISITOR AND EMPLOYEE LOG
(DAILY SIGN-IN/SIGN-OUT SHEET)
ENVIRO-CHEM SUPERFUND SITE
ZIONSVILLE, INDIANA

Figure
7

Drafter: APR | Date: 09/15/05 | Contract Number: 21-6585K | Approved: | Revised:

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ATTACHMENT 1

Respiratory Protection Program

ATTACHMENT 1

Respiratory Protection Program

1.0 INTRODUCTION

The respiratory protection program is in accordance with Occupational Safety and Health Administration (OSHA) regulations in 29 CFR 1910.134. The primary objective of this program is to reduce employee exposure to contaminated air in the breathing zone, which may contain harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors.

When feasible, the exposure to contaminants in the breathing zone will be eliminated by engineering controls such as ventilation, enclosure or confinement of the area, and substitution of a less hazardous material or process. When effective engineering controls are not feasible, or while they are being instituted, respiratory protective equipment will be used to prevent employee exposure to contaminants in the breathing zone.

The Respiratory Protection Program is presented in the following sections and includes requirements for medical evaluations, training, procedures for selecting and proper use of respirators, procedures for cleaning, disinfecting, storing, inspecting, and repairing respirators, program evaluation, and respirator fit testing procedures.

2.0 RESPIRATOR CLEARANCE AND MEDICAL EVALUATIONS

Only employees who have received medical evaluation to wear a respirator, training and a proper fit test will be permitted to wear a respirator in the field.

The medical evaluation shall be conducted first to determine the employee's ability to use a respirator before the employee is fit tested or required to use the respirator in the workplace. Each site remediation contractors' office will identify a physician or other licensed health care professional (PLHCP) who will perform the medical evaluations. The medical evaluations shall obtain at a minimum the information contained in Part A, Appendix C to 29 CFR 1910.134.

The Health and Safety Coordinator (HSC) for each site remediation contractor will be responsible for ensuring that each employee working at Third Site meets all the requirements before he or she is issued a respirator for field use. An individual at each office who is experienced in providing fit tests will be responsible for providing annual respirator fit tests to employees. The fit-test records will be maintained as part of an employee's health and safety file.

Respirator clearance will not be given to any employee with facial hair (e.g., beard, long sideburns) sufficient to interfere with the face-to-facepiece seal. Facial hair of this nature may break the seal between the face and respirator facepiece, causing a substantial reduction in the protection against airborne contaminants normally afforded by the respirator. Respirator

clearance will also not be given to any employee who cannot attain a proper face-to-facepiece seal for any other reason.

3.0 RESPIRATOR TRAINING PROGRAM

The purpose of respirator training is to ensure that site personnel use their respirators properly and understand the limitations of the respirator. Respirator training is provided in compliance with 29 CFR 1910.120 and 29 CFR 1910.134. Training will be conducted prior to initial use of a respirator, annually, when workplace conditions change or whenever a situation arises in which retraining appears necessary to ensure proper and safe respirator use. Respirator training can be combined with the initial 40-hour health and safety training, the 8-hour annual health and safety refresher course, or the annual fit test. The subject areas that are addressed during respirator training include:

- Health effects associated with general categories of air contaminants (e.g., acids, bases, organic solvents);
- Importance of a respirator and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- Rationale for selection of Level B respiratory protection (self-contained breathing apparatus or supplied air respirator) or Level C respiratory protection;
- Capabilities and limitations of Level B and Level C respiratory protection;
- Proper methods for inspection, donning, and checking the seals of the respirator or facepiece, especially use in emergency or respirator malfunction situations;
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators;
- Respirator and facepiece maintenance and storage.

4.0 LEVEL C RESPIRATORY PROTECTION

4.1 Guidance for Proper Respirator and Cartridge Selection

Respirators used, if any, shall be certified by the National Institute for Occupational Safety and Health (NIOSH). The respirator shall be used in compliance with the conditions specified in the certification.

The selection of respiratory protective equipment should be guided by considerations of risk to health, as well as relative comfort during respirator usage. Respirator and cartridge selection for field activity should be based on the following criteria:

- The nature of the hazardous situation encountered;
- The type of respiratory hazard, including physical properties, warning properties, physiological effects on the body, concentration of toxic materials, established exposure limits for air contaminants, and established Immediately Dangerous to Life or Health (IDLH) levels for air contaminants;
- The period of time and the activities for which respiratory protection is needed; and
- The physical characteristics, respiratory protection factors, functional capabilities, and limitations of the various types of respirators.

Although it is difficult to predict the airborne concentrations of contaminants that result from intrusive site activities (e.g., installation of ground water monitoring wells), analytical information may be available to identify contaminants of concern at the site (e.g., prior soil sampling results). This information should be considered when selecting respirators or cartridges. Where the potential hazard cannot be identified or exposure level cannot be reasonably estimated, the atmosphere will be considered to be IDLH.

Certain situations may preclude project personnel from performing field work in Level C respiratory protection, for instance, oxygen-deficient atmospheres (less than 19.5% oxygen) and IDLH atmospheres. Full face supplied air respirators (SAR) or self-contained breathing apparatus (SCBA) certified by NIOSH are mandatory in these situations. A non-IDLH atmosphere with sufficient oxygen may still require the use of supplied air respirators. This would include atmospheres containing contaminants that do not have adequate warning properties (e.g., taste, smell, or irritation) in the event of cartridge breakthrough; or the desired

protection factor (concentration outside the respirator divided by concentration inside the respirator) exceeds the assigned protection factor for the air-purifying respirator.

Air-purifying respirators (APRs) can be full-face, half-face, and quarter-face models, based on the contaminants present. Cartridges are constructed of a variety of filter media. Many combination chemical cartridges exist, some of which are designed to remove organic vapors, acid mists, and particulates. The cartridge must be NIOSH certified and made by the same manufacturer as the respirator. Site workers should confer with the office HSC as necessary to ensure selection of the appropriate cartridge for a particular site.

The various types of respirators (full-face, half-face, or quarter-face) offer different level of protection. The full-face respirator affords the greatest respiratory and eye protection. Lens kits will be provided to employees wearing full respirators and requiring glasses. These lenses mount inside the respirator without affecting the respirator face seal.

OSHA requires that a qualitative fit-test be administered annually to select the appropriate size APR. This plan's qualitative fit-test procedure is described in Section 8.0.

Site Health and Safety Plans will specify airborne contaminant levels for upgrading personal protection from Level D to Level C and from Level C to Level B. The Site Health and Safety Plan will also include the particular cartridge type for protection against airborne contaminants. Level C personal protection includes the use of an APR with appropriate cartridges.

4.2 Conditions for Use of the Air-Purifying Respirator

Level C personal protection may consist of different types of personal protective clothing based on the potential for dermal uptake of chemicals, but will always include an APR with appropriate cartridges. Level C respiratory protection will be required if airborne contaminants exceed the action level for upgrading from Level D and are less than the action level for upgrading from Level C to Level B as specified in the Site Health and Safety Plan. Other conditions that must be met in order to upgrade from Level D to Level C respiratory protection include:

- Prior respirator clearance (Section 2.0 of this attachment);
- Oxygen concentrations in the breathing zone between 19.5% and 25%; and
- Airborne contaminants below IDLH levels.

Use of an APR where its use will reduce exposure to airborne contaminant levels below the OSHA Permissible Exposure Limits (PELs), and, in the absence of the OSHA-PEL, the Threshold Limit Value-Time Weighted Averages (TLV-TWAs) for the affected employee;

Airborne contaminants must provide sufficient warning properties in the event of cartridge breakthrough; and Airborne contaminant levels that do not exceed specified Maximum Use Concentration (MUC) for the cartridge (pending for OSHA definition).

Air-purifying respirators must not be worn when certain compounds could be present at or above their PELs or TLV-TWA. These compounds include, but are not limited to:

Acrolein	Methylene bis-phenyl isocyanate
Aniline	Nickel carbonyl
Arsine	Nitrobenzene
Bromine	Nitrogen oxide
Carbon monoxide	Nitroglycerin
Dimethylaniline	Nitromethane
Dimethyl sulfate	Ozone
Hydrogen cyanide	Phosgene
Hydrogen fluoride	Phosphine
Hydrogen selenide	Phosphorus trichloride
Hydrogen sulfide	Stibine
Methyl alcohol (methanol)	Sulfur chloride
Methyl bromide	Toluene diisocyanate
Methylene chloride	Vinyl chloride

Many of the above compounds are not effectively absorbed by a cartridge (e.g., methylene chloride); some do not provide adequate warning properties over a range of concentrations (e.g., hydrogen sulfide); some are very reactive (e.g., hydrogen fluoride); and some may cause chemical sensitization at very low concentrations (e.g., toluene diisocyanate). If site personnel determine that any of these compounds are present at or above PEL or TLV-TWA levels, they are not to perform field work in Level C personal protection. Exceedance of the OSHA-PEL or TLV-TWA will require additional assessment and may require the use of Level B respiratory protection.

Use of air-purifying respirators for protection against chlorinated hydrocarbons (e.g., trichloroethylene, 1,1,1-trichloroethane) should be evaluated by the office HSC or a CIH. Many of the chlorinated hydrocarbons do not provide adequate warning properties (e.g., taste, smell). Charcoal-containing cartridges can be used to effectively minimize exposure to chlorinated hydrocarbons. The capacity of the charcoal to bind the chlorinated hydrocarbons and the ambient level of hydrocarbons must be considered to determine when breakthrough could occur.

4.3 Change Schedule and Identification

OSHA regulations in 29 CFR 1910.134 require that air-purifying respirator cartridges or canisters for protection against gases and vapors must be equipped with an end-of-service-life indicator (ESLI) certified by NIOSH. In the event that there is no ESLI, a change schedule for the cartridges/canisters must be implemented which will ensure that the cartridges are changed before the end of their service life.

All cartridges and canisters shall be labeled and color-coded with the NIOSH approved methods and the labels shall not be removed and shall remain legible at all times.

4.4 Inspection of APRs

Respirators must be inspected before and after each use and during cleaning; respirators not in regular use must be inspected after each use and at least monthly. In compliance with these requirements, respirators used by field employees will be thoroughly inspected before and after use and during cleaning. It is the responsibility of the individual respirator user to conduct the required inspection. The office HSC will ensure that stock (i.e., unassigned) equipment is inspected monthly. Records of monthly inspections will be maintained by the HSC or designee.

Table 1-1 describes the procedure site personnel will follow for inspection of their personal respirators. In general, the inspection of the respirator will include a check for tightness of all connections, a check on the condition of the respiratory inlet and outlet coverings, head harness and assembly, valves, and the end-of-service-life indicators and shelf-life dates on all filters (cartridges). All rubber and elastomeric parts of the respirator will be checked for pliability, proper sealing, and any sign of deterioration.

TABLE 1-1. Inspection of APRs

(1) Visually inspect the entire unit for any obvious damage, defects, deterioration and/or extreme distortion.

(2) Make sure that the facepiece harness is not damaged. The serrated portion of the harness can fragment, and this will prevent proper face seal adjustment.

(3) Inspect all rubber or elastomer parts for pliability and signs of deterioration.

(4) Inspect the lens for damage, excessive scratching and cracks (which could interfere with proper vision), and proper fit in the facepiece. Ensure that the retaining clamp is properly in place.

(5) Pull off the cover to the exhalation valve and check valve for debris, for build-up of foreign materials, or for tears in the neoprene valve (which could cause leakage).

(6) Screw off cartridges and visually inspect neoprene inhalation valves (two) for tears and/or debris. Make sure that the inhalation valves and cartridge receptacle gaskets are in place and that their integrity has not been breached.

(7) Make sure that a protective lens cover is attached to the lens.

(8) Make sure that the speaking diaphragm retaining ring is tight.

(9) Make sure that the correct cartridges are being used.

(10) Don and perform a positive and negative pressure test.

(11) Keep a record of all inspection dates and findings.

*Adapted from Mine Safety Appliances Corp. (MSA), Instructions for Use of MSA Ultratwin.

4.5 Maintenance and Care of APRs

4.5.1 Cleaning and Disinfecting APRs

OSHA's 29 CFR 1910.134 requires that:

- Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition;
- Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals;
- Respirators maintained for emergency use shall be cleaned and disinfected after each use; and
- Respirators used in fit testing and training shall be cleaned and disinfected after each use.

In compliance with these requirements, respirators used by field personnel will be cleaned and/or disinfected after each use and after each day of use, and will periodically be broken down to their components and thoroughly cleaned and disinfected.

While in the field, respirators will be cleaned after each use with a pre-packaged non-alcohol disinfectant pad. This procedure will be performed by the APR user each time the respirator is doffed, unless gross contamination has occurred. In this case, a more thorough decontamination procedure will be performed.

After each day of respirator use, APRs will be cleaned and decontaminated thoroughly using warm water and sanitizer provided by the manufacturer. Without disassembling the unit, the APR user will scrub the respirator inside and outside to remove dust, dirt and other contamination. Care should be taken to prevent copious amounts of water from entering the inside of the mask or the speaking diaphragm and the inhalation and exhalation valves. After washing, APRs should be hung upside down (via the chin cup) and allowed to drip dry overnight in a clean, dry place. Care must be taken not to damage or distort the facepiece. If gross contamination has occurred, or if the nature of the contaminants suggests that a more thorough cleaning is required, a complete breakdown of the APR, as described below, will be performed.

Based on the contaminants of concern, the extent of gross contamination, and other relevant factors, APRs will be broken down to their components (as described in the

manufacturer's schematic display, which usually accompanies the unit) and thoroughly washed and sanitized after each day of use. This will be done only by persons who have received thorough training in the proper procedure. As recommended in 29 CFR 1910.134 Appendix B-2, the steps to be followed for this level of cleaning/sanitizing are as follows:

- Remove filters, cartridges or canisters. Dispose the spent cartridges as hazardous materials and/or in accordance with an approved Site Health and Safety Plan. Spent cartridges should be damaged/distorted and discarded to prevent accidental reuse.

- Following manufacturer's instructions, disassemble facepieces by removing speaking diaphragms, inhalation valves, exhalation valves, etc.

- Wash components in warm water (not to exceed 110°F or 43°C) with mild detergent or with a cleaner recommended by the manufacturer. Wearing (surgical) gloves, swirl the various components and the mask itself in the cleaning solution for several minutes and thoroughly wash the mask and component parts using a soft sponge or brush (stiff bristle, but not wire). Extreme care must be taken to avoid damaging the thin neoprene inhalation and exhalation valves, as well as the Mylar speaking diaphragm, in this process.

- Rinse all components thoroughly in clean, warm water (not to exceed 110° F or 43° C) to remove all traces of the cleaning solution (preferable running water). Drain.

- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

  - Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 110° F or 43° C; or

  - Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams

ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 110° F or 43° C; or

- Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturers.

- Rinse all components thoroughly in clean, warm water (not to exceed 110° F or 43° C), preferable running water. Drain. Thorough rinsing is very important, as residual cleaning solution or disinfectants may cause dermatitis in some individuals.

- Hand-dry all components thoroughly with a clean lint-free cloth or air-dried. Inspect them for any defects and/or damage, and reassemble the unit.

- Store properly until the next use (the manufacturer-supplied plastic bag or a surplus type gas mask bag works well).

4.5.2 Maintenance and Repair of APRs

Replacement of parts, and the repair of parts, and the repair of all respiratory apparatus will be performed only by persons properly trained and certified in techniques of respiratory assembly and correction of defects. Substitution of parts from one type of respirator to another is strictly forbidden. To do so would invalidate the NIOSH approval of the device and could significantly compromise the health/life of the user. Field personnel are not authorized to repair respirators.

4.5.3 Storage of APRs

OSHA requires that respirators be stored in such a manner as to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Emergency respirators shall be kept accessible to the work area, clearly labeled as emergency respirators and stored in accordance with any applicable manufacturer instructions.

5.0 LEVEL B RESPIRATORY PROTECTION

Full facepiece pressure demand (positive pressure) atmosphere-supplying respirators (SCBAs or SARs) will be used when APRs cannot provide sufficient protection (e.g. IDLH atmosphere) or when contaminants are unknown. Level B respiratory protection must include atmosphere-supplying respirators. Personnel who have not received proper training in the use of these devices are strictly forbidden to use them.

Site personnel should use the MSA Model 401 SCBA or a similar Scott SCBA. These units are positive pressure demand, low pressure (2,216 psi) units capable of providing approximately 30 minutes of breathing time, depending on personal breathing rate and other factors. These units are NIOSH approved and are capable of delivering 100 liters of air per minute while maintaining positive pressure in the facepiece.

Other makes and models of SCBAs and SARs may be used if warranted. However, in all cases, they must be positive pressure demand units.

The criteria for selecting Level B respiratory protection include any of the following:

- The types and atmospheric concentrations of contaminants have been identified and require a high level of respiratory protection. For example, this would include atmospheres with IDLH concentrations (but not a severe skin hazard), or atmospheres that do not meet the selection criteria permitting the use of Level C respiratory protection (see Section 4.0 above).
- The atmosphere contains less than 19.5% oxygen.
- Unknown atmospheres exist.
- The atmosphere contains contaminants with poor warning properties.

Level B respiratory protection is the minimum level of protection recommended for initial entry where the type and concentrations of airborne contaminants are unknown. A limit of 500 ppm total atmospheric gas/vapor concentration on a PID/FID has been selected as a decision point for a careful evaluation of the risks associated with higher concentrations.

NOTE: When using a SCBA or a SAR during subfreezing weather, extreme caution must be exercised, since cold weather can cause regulator problems from condensation and freezing of exhalation valves.

5.1 Inspection and Checkout of SCBAs

OSHA inspection requirements, as specified in Section 4.4 above for APRs, are also applicable to SCBAs. Records of routine maintenance and inspection are kept by the office HSC or designees. In the field, each employee will perform an inspection and checkout, prior to each use. Table 1-2 presents a description of the procedures used in the monthly and routine inspections of the SCBA.

Briefly, SCBAs consist of the following components:

- Cylinder and cylinder valve,
- Backpack and harness assembly,
- Regulator and high-pressure hose,
- Pressure gauge and low air warning device, and
- Facepiece and breathing tube.

The inspection of SCBAs will include a check for tightness of all connections; a check of the condition of the respiratory inlet and outlet coverings, head harness and assembly, valves, and connecting tubes; and a thorough check of the regulators, alarms and other warning systems. All rubber and other elastomeric parts (O-rings, gaskets, etc.) of the SCBAs will be checked for pliability, proper sealing, and any sign of deterioration. Each air cylinder will also be checked to ensure its integrity and its readiness for use.

TABLE 1-2. SCBA Inspection Check List

Monthly Inspection

- Check cylinder label for current hydrostatic test.
- Inspect cylinder for dents and/or gouges and unwrapping of the fiberglass wrap.
- Inspect cylinder gauge for damage.
- Complete routine inspection (see below).
- Fill out the appropriate records with results and recommendations.

Routine Inspection (Perform immediately prior to donning and after cleaning.)

- Before proceeding, check:
  - High-pressure hose connection is tightly on the cylinder fitting.
  - Bypass valve is closed.
  - Mainline valve is closed.
  - Regulator outlet is not covered or obstructed.
  - O-rings are intact.

- Backpack and harness assembly
  - Visually inspect straps for wear, damage and completeness.
  - Check wear (especially around attachment points and around serrated areas) and function of belts.
  - Check backplate and cylinder retaining ring for damage and functioning.

- Cylinder and high-pressure hose assembly
  - Check cylinder to assure that it is firmly attached to the backpack.
  - Open cylinder valve; listen or feel for leakage around packing and hose connection.
  - Check high pressure hose for damage or leaks.

- Regulator
  - Cover regulator outlet with palm of hand.
  - Open mainline valve.
  - Note stoppage of air flow after positive pressure builds.
  - Close mainline valve and remove hand from regulator outlet.
  - Open by-pass valve slowly to assure proper functioning (do not cover regulator outlet).

- Close by-pass valve.
- Cover regulator outlet again with palm of hand.
- Open mainline valve.
- Note pressure reading on regulator gauge.
- Close cylinder valve while keeping hand over regulator outlet.
- Slowly remove hand from outlet and allow air to escape.
- Note pressure when low-pressure alarm warning sounds at approximately 600 psi.
- Remove hand from regulator outlet.
- Close mainline valve.
- Check regulator for leaks by blowing air into the regulator for 5-10 seconds. Draw air from regulator outlet for 5-10 seconds. If a positive pressure or vacuum (negative pressure) cannot be maintained, there is a leak. Do not use SCBA.

- Facepiece and corrugated breathing tube
  - Visually inspect facepiece and harness for damage, serration and deteriorated rubber.
  - Inspect lens for damage and proper seal in the facepiece. Inspect exhalation valve for damage and buildup of foreign materials.
  - Stretch breathing tube and carefully inspect for holes and deterioration.
  - Inspect connector for damage and presence/integrity of O-ring.
  - Perform positive and negative pressure checks with facepiece donned.

- Storage
  - Refill cylinder to approximately 2,200 psi.
  - Close cylinder valve.
  - Tightly connect high-pressure hose to cylinder.
  - Bleed pressure from high-pressure hose by opening mainline valve.
  - Close mainline valve and bypass valves.
  - Fully extend all straps.
  - Store facepiece in a clean plastic bag for protection.
  - Store entire unit in carrying case provided.

Adapted from Mine Safety Appliance Corp. (MSA), MSA 401-Ultralite SCBA Inspection and Checkout.

5.2 Maintenance and Care of SCBAs

5.2.1 Cleaning and Disinfecting SCBAs

Cleaning procedures for SCBA facepieces are identical to those described for the APR in Section 4.4.1. The backpack and harness assembly unit is cleaned with a cleaning solution and a brush. Following cleaning, the facepiece is connected to the regulator and an operational check is performed. Care must be taken to avoid getting water in the respirator.

5.2.2 Maintenance and Repair of SCBAs

The OSHA standard mandates that replacement or repair shall be done by experienced persons with parts designated for the respirator. SCBAs will be returned to the manufacturer for repair.

5.2.3 Filling SCBA Cylinders

SCBA cylinders are to be filled with certified Grade D breathing air at approximately 2,200 psi before use in the field. The Grade D breathing air is specified in ANSI/Compressed Gas Association Commodity Specification for Air, Pamphlet G-7.1-1989. Pure oxygen must not be used to fill SCBA cylinders. An SCBA with less than a 15-minute air supply may be used for emergency escape only.

6.0 EVALUATION OF RESPIRATORY PROTECTION PROGRAM EFFECTIVENESS

In accordance with OSHA 29 CFR 1910.134(l) and ANSI Z88.2 (1980), site contractors shall have a policy to regularly inspect and evaluate the corporate Respiratory Protection Program's (the "Program") effectiveness to ensure proper implementation of the Program and that all persons involved are being provided with appropriate respiratory protection. As further assurance of adequate protection, periodic medical monitoring of the users may be performed.

The information obtained from the periodic inspections, medical surveillance, and users' comments will be used to evaluate the overall effectiveness of the Program. If the information indicates inadequacies in the Program, the Program will be modified to address these inadequacies.

7.0 RECORD KEEPING

Record keeping has been addressed in the relevant sections above. As a summary, the following records shall be maintained by each remediation contractor:

- Records of medical evaluation;
- Records of fit testing results showing the employee's name, the make, model, style, and size of the respirator, date fit test was conducted, pass/fail result; and
- A copy of this respirator protection program (most current version).

8.0 RESPIRATORY FIT-TEST PROTOCOLS

8.1 General Requirements

OSHA requires that before an employee uses any respirator, the employee must be fit tested with the same make, model, style, and size of respirator that he/she will be using. The fit test shall be administered using an OSHA-accepted qualitative fit test (QLFT) or quantitative fit test (QNFT) protocol. There are four QLFT protocols recommended by OSHA in its latest revision to 29 CFR 1910.134 (effective April 8, 1998): isoamyl acetate (banana oil), saccharin solution aerosol, Bitrex solution aerosol and the irritant smoke protocol.

Field personnel shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the employee. Prior to the selection process, the employee shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the employee in evaluating the fit and positioning of the respirator. The employee shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit.

Assessment of comfort shall include a review of the following points with the employee and allowing the employee adequate time to determine the comfort of the respirator:

- Position of the mask on the nose;
- Room for eye protection;
- Room to talk; and
- Position of mask on face and cheeks.

The following criteria shall be used to help determine the adequacy of the respirator fit:

- Chin properly placed;
- Adequate strap tension, not overly tightened;
- Fit across nose bridge;
- Respirator of proper size to span distance from nose to chin;
- Tendency of respirator to slip; and
- Self-observation in mirror to evaluate fit and respirator position.

8.2 User Seal Check Procedures

The respirator user shall perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed below or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

8.2.1 Negative Pressure Fit Check

The negative pressure fit check is performed by covering the inlet openings to the APR cartridges with the palms of the hands. Inhale gently and hold breath for 10 seconds, the APR should remain slightly collapsed. If it does not remain slightly collapsed, this is an indicator of an inward leakage of air. The APR should then be checked for materials defects and replaced with another APR or refitted to the employee's face.

8.2.2 Positive Pressure Fit Check

The positive pressure fit check is performed by placing the palm of the hand over the exhalation valve and gently exhaling for 10 seconds to create positive pressure inside the facepiece. If an outward leakage of air occurs, the APR should be readjusted. If, after readjustment, leakage still occurs, another APR should be used.

8.3 Qualitative Fit Test

The QLFT shall not be conducted if there is any hair growth between the skin and the face piece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel that interferes with a satisfactory fit shall be altered or removed. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use, which could interfere with respirator fit.

Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

8.3.1 Test Exercises

The following test exercises are to be performed by the test subject in the following manner:

1. Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

2. Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

3. Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

4. Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

5. Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

   Rainbow Passage

   When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a

man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

6. Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments that do not permit bending over at the waist.

7. Normal breathing. Same as exercise (1).

Each test exercise shall be performed for one minute. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

8.3.2 Irritant Smoke QLFT Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

General Requirements and Precautions

- The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

- Only stannic chloride smoke tubes shall be used for this protocol.

- No form of test enclosure or hood for the test subject shall be used.

- The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

- The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

Sensitivity Screening Check

- The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

- The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

- The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed or provide safety goggles.

- The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

Irritant Smoke Fit Test Procedure

- The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

- The test subject shall be instructed to keep his/her eyes closed or to wear safety goggles.

- The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the

mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

- If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

- The exercises identified in Section 8.3.1 shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

- If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

- Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

- If a response is produced during this second sensitivity check, then the fit test is passed.

8.4 Respirator Fit Test Worksheet

On the following page is an example "Respirator Qualitative Fit Test Worksheet." The fit tester and the employee should be certain to fill out all information accurately following successful completion of the fit test. The employee should receive the original, the fit tester should keep a copy, and one copy should be placed in the employee's personnel file or health and safety file.

RESPIRATOR QUALITATIVE FIT TEST WORKSHEET

A. EMPLOYEE: _____ DATE: _____
EMPLOYEE NO.: _____

EMPLOYEE JOB TITLE/DESCRIPTION: _____
_____

B. ENVIRON OFFICE: _____
LOCATION/ADDRESS: _____
_____

C. RESPIRATOR SELECTED: _____
MANUFACTURER: _____
NIOSH APPROVAL NUMBER: _____ MODEL:_____

D. CONDITIONS THAT COULD AFFECT RESPIRATOR FIT:

☐ CLEAN SHAVEN	☐ FACIAL SCAR
☐ 1 - 2 DAY BEARD GROWTH	☐ DENTURES ABSENT
☐ 2+ DAY GROWTH	☐ GLASSES
☐ MOUSTACHE	☐ NONE

COMMENTS: _____
_____

E. USER SEAL CHECK:

Negative Pressure	☐ PASS	☐ FAIL	☐ NOT DONE
Positive Pressure	☐ PASS	☐ FAIL	☐ NOT DONE

F. SENSITIVITY CHECK: ☐ PASS ☐ FAIL

G. EXERCISES

- ☐ Standing normally, breath normally
- ☐ Standing normally, take deep breaths
- ☐ Turn your head from side to side slowly, ensure that breaths are taken at farthest points of each side
- ☐ Standing normally, move your head up and down slowly, ensure breaths are taken at farthest points
- ☐ Talk LOUDLY, count backward from 100 or read the Rainbow Passage
- ☐ Bend over and touch your toes or jog in place if the test unit does not permit bending
- ☐ Standing normally, breath normally

H. QUALITATIVE FIT TESTING RESULT

☐ PASS ☐ FAIL ☐ INCOMPLETE

COMMENTS: _____

_____

I. EMPLOYEE ACKNOWLEDGMENT OF TEST RESULTS:

EMPLOYEE SIGNATURE: _____ DATE: _____

TEST CONDUCTED BY: _____ DATE: _____

DISCLAIMER

The above respirator fit test was performed on and by the persons listed. The results indicate the performance of the listed respiratory protective device, as fitted on the employee named on this record under controlled conditions. Fit testing, as performed, measures the ability of the respiratory protective device to provide protection to the individual tested. Test conductor expresses or implies no guarantee that this or an identical respiratory protective device will provide adequate protection under conditions other than those present when this test was performed. Improper use, maintenance, or application of this or any other respiratory protection device will reduce or eliminate protection.

ATTACHMENT 2

Protective Equipment and Decontamination Procedures

ATTACHMENT 2

Protective Equipment/Decontamination Procedures

1.0 INTRODUCTION

Personal protective equipment must be worn during field work activities when: (1) atmospheric contamination is known or suspected to exist, (2) there is a potential for the generation of vapors or gases, or (3) direct contact with toxic substances may occur.

The On-Site Project Safety Office (On-Site PSO) will determine the level or combination of personal protective equipment that affords the appropriate level of protection and ensure that safe work practices are followed. The requirements specified for Levels A, B, C, and D protection are outlined in the section that follows.

2.0 LEVELS OF PROTECTION

2.1 Level D

- Work Uniform
- Coveralls – cotton or chemical resistant
- Gloves (outer) – safety or chemical resistant
- Boots/shoes (inner) – chemical resistant, steel toe and shank
- Boots (outer) – chemical resistant, disposable (optional)
- Hard had (when overhead equipment or structures are present)
- Escape mask (optional)

2.1.2 Criteria for Selection

Level D protection should be used when:

- Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with any chemicals; and
- Only nonintrusive work is being completed at the site.

2.2 Level C

2.2.1 Personal Protective Equipment

- Full-face, air-purifying respirator – canister or cartridge, approved by the Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH)
- Chemical-resistant clothing – disposable, hooded, one- or two-piece chemical splash suit
- Gloves (outer) – chemical resistant
- Gloves (inner) – chemical resistant
- Boots (inner) – Chemical resistant, steel toe and shank
- Disposal boot covers (outer) – if leather work boots are worn, then outer chemical-resistant boots are necessary
- Hard hat
- Escape mask (optional)
- Two-way radio – intrinsically safe (optional)

2.2.2 Criteria for Selection

Meeting all of the following criteria warrants the use of Level C protection:

- Oxygen concentrations are not less than 19.5 percent or greater than 25 percent by volume.

- The types of air contaminants have been identified, concentrations have been measured, and an air-purifying respirator is available that can remove the contaminants.

- Measured air concentrations of identified substances will be reduced by the respirator below the substance's NIOSH permissible exposure limits (PELs), and the concentration will be within the service limit of the canister.

- Atmospheric contaminant concentrations do not exceed Immediately Dangerous to Life and Health (IDLH) levels.

- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin.

- Job functions do not require self-contained breathing apparatus (SCBA).

- Direct readings are 5 to 500 Vppm above background on the HNu or organic vapor meter (OVM) photoionization meter.

- All criteria for the use of air-purifying respirators are met.

2.2.3 Decontamination Procedures

See Table 2-1, which follows.

2.3 Level B

2.3.2 Criteria for Selection

Meeting one of the following criteria warrants the use of Level B protection:

- The type and atmospheric concentration of substances have been identified and requires a high level of respiratory protection, but less skin protection than Level A. This would be:

  - Atmospheres with IDLH concentrations in air that do not represent a severe skin hazard, or

  - Chemicals or concentrations involved do not meet the selection criteria permitting the use of air-purifying respirators.

- If the HCN meter detects HCN at concentrations of less than 10 ppm and the Sensidyne detector tube confirms the reading, a modified Level B is warranted that includes hooded Saranex-coated coveralls taped at the wrist, ankle, and the hood's "respirator line".

- The atmosphere contains less than 19.5 percent oxygen.

- It is highly unlikely that the work being done will generate high concentrations of vapors, gases, or particulates, or splashes of material that will affect the skin.

- Atmospheric concentrations of unidentified vapors or gases are indicated by direct readings of between 500 and 1,000 Vppm above background on the HNu OVM meter, but vapors and gases are not suspected of containing concentrations of skin toxicants.

2.3.3 Decontamination Procedures

See Table 2-2, which follows.

2.4 Level A

2.4.1 Personal Protective Equipment

- Fully encapsulating chemical-resistant suit
- Disposable protective suit, gloves, and boots – depending on suit construction, worn over totally encapsulating suit (optional)
- All items from Level B protection

2.4.2 Criteria for Selection

Meeting any of the following criteria warrants the use of Level A protection:

- The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either measured (or the potential for) high concentrations of atmospheric vapors, gases, or particles.

- The site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to the skin or are cable of being absorbed by the skin.

- Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible. Skin contact includes: splash, immersion, or contamination from atmospheric vapors, gases, or particulates.

- Operations are being conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A have not yet been determined.

- Direct field readings on a HNu or OVM photoionization or a hydrogen cyanide meter and Sensidyne detector tubes or similar instruments indicate high levels of unidentified vapors and gases in the air.

2.4.3 Decontamination Procedures

See Table 2-3, which follows.

TABLES

TABLE 2-1

Level C Decontamination Procedures

PROCEDURES
1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.
2. Scrub outer boot covers and gloves with decontamination solution or detergent/water.
3. Rinse off decontamination solution from step 2 using copious amounts of water. Repeat as many times as necessary.
4. Remove tape around boots and gloves and deposit in container with plastic liner.
5. Remove boot covers and deposit in container with plastic liner.
6. Remove outer gloves and deposit in container with plastic liner.
7. Thoroughly wash splash suit and safety boots. Scrub with long-handle, soft bristle scrub brush and copious amounts of decontamination solution or detergent/water. Repeat as many times as necessary.
8. Rinse off decontamination solution or detergent/water using copious amounts of water. Repeat as many times as necessary.
9. If worker leaves the Exclusion Zone to change the respirator's cartridges, this is the last step in the decontamination procedure. Once the worker's cartridges have been exchanged, new outer gloves and boot covers are donned, and the joints are taped, the worker may return to the Exclusion Zone.
10. Remove safety boots and deposit in container with plastic liner.
11. With assistance of a helper, remove splash suit and deposit in container with plastic liner.
12. Wash inner gloves with decontamination solution or detergent/water that will not harm skin. Repeat as many times as necessary.
13. Rinse inner gloves with water. Repeat as many times as necessary.
14. Remove respirator. Remove cartridges from respirator and then decontaminate respirator with decontamination solution or detergent/water. Avoid touching face and gloves.
15. Rinse respirator with copious amounts of water. Avoid touching face with gloves.
16. Remove inner gloves and deposit in container with plastic liner.
17. Remove clothing soaked with perspiration. Place in container with plastic liner. Do not wear inner clothing off-site since there is a possibility small amounts of contaminants might have been transferred in removing the splash suit.
18. Shower if highly toxic, skin-corrosive or skin-absorbable are known or are suspected to be present. Wash hands and face if shower is not available.
19. Put on clean clothes. A dressing trailer may be needed in inclement weather.

TABLE 2-2

Level B Decontamination Procedures

PROCEDURES
1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.
2. Scrub outer boot covers and gloves with decontamination solution or detergent/water.
3. Rinse off decontamination solution from step 2 using copious amounts of water. Repeat as many times as necessary.
4. Remove tape around boots and gloves and deposit in container with plastic liner.
5. Remove boot covers and deposit in container with plastic liner.
6. Remove outer gloves and deposit in container with plastic liner.
7. Thoroughly wash chemical-resistant splash suit, SCBA, gloves, and safety boots. Scrub with long-handle, soft bristle scrub brush and copious amounts of decontamination solution or detergent/water. Wrap SCBA regulator (if belt-mounted type) with plastic to keep out water. Wash backpack assembly with sponges or cloths.
8. Rinse off decontamination solution or detergent/water using copious amounts of water. Repeat as many times as necessary.
9. If worker leaves the Exclusion Zone to change the air tank, this is the last step in the decontamination procedure. Once the worker's air tank has been exchanged, new outer gloves and boot covers are donned, and the joints are taped, the worker may return to the Exclusion Zone.
10. Remove safety boots and deposit in container with plastic liner.
11. While still wearing the facepiece, remove the backpack and place on a table. Disconnect hose from regulator valve and proceed to next step.
12. With assistance of a helper, remove splash suit and deposit in container with plastic liner.
13. Wash inner gloves with decontamination solution or detergent/water that will not harm skin. Repeat as many times as necessary.
14. Rinse inner gloves with water. Repeat as many times as necessary.
15. Remove facepiece. Avoid touching face with gloves. Decontaminate facepiece with decontamination solution or detergent/water.
16. Rinse facepiece with copious amounts of water. Avoid touching face with gloves.
17. Remove inner gloves and deposit in container with plastic liner.
18. Remove clothing soaked with perspiration. Place in container with plastic liner. Do not wear inner clothing off-site since there is a possibility small amounts of contaminants might have been transferred in removing the splash suit.
19. Shower if highly toxic, skin-corrosive or skin-absorbable are known or are suspected to be present. Wash hands and face if shower is not available.
20. Put on clean clothes. A dressing trailer may be needed in inclement weather.

TABLE 2-3

Level A Decontamination Procedures

PROCEDURES
1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.
2. Thoroughly wash fully encapsulating suit and boots. Scrub with long-handle, soft bristle scrub brush and copious amounts of decontamination solution or detergent/water. Wrap SCBA regulator (if belt-mounted type) with plastic to keep out water. Wash backpack assembly with sponges or cloths.
3. Rinse off decontamination solution or detergent/water using copious amounts of water. Repeat as many times as necessary.
4. If worker leaves the Exclusion Zone to change the air tank, this is the last step in the decontamination procedure. Once the worker's air tank has been exchanged and the fully encapsulating suit has been sealed, the worker may return to the Exclusion Zone.
5. With assistance of a helper, remove fully encapsulating suit and deposit in container with plastic liner.
6. While still wearing the facepiece, remove the backpack and place on a table. Disconnect hose from regulator valve and proceed to next step.
7. Remove facepiece. Wash facepiece with decontamination solution or detergent/water.
8. Rinse facepiece with copious amounts of water.
9. Remove inner gloves and deposit in container with plastic liner.
10. Remove clothing soaked with perspiration. Place in container with plastic liner. Do not wear inner clothing off-site since there is a possibility small amounts of contaminants might have been transferred in removing the splash suit.
11. Put on clean clothes. A dressing trailer may be needed in inclement weather.

ATTACHMENT 3

Hearing Conservation Plan

ATTACHMENT 3

Hearing Conservation Plan

1.0 INTRODUCTION

This Hearing Conservation Plan (HCP) contains the standards to be followed to ensure protection against excessive noise levels associated with field activities. These standards are designed to meet the auditory and noise-level requirements issued under 29 CFR 1926.52 and 1926.101 and, if warranted, to be incorporated into a site-specific Health and Safety Plan as an appendix. According to 29 CFR 1926.52, employees must be protected against noise levels that exceed those indicated on Table 3-1 when measured on the "A" scale of a standard sound level meter at slow response. In addition, employers are required to establish a hearing conservation program for any of their employees who are exposed to any of the values shown on Table 3-1. The standards associated with both of these requirements are described in detail in the following sections of this HCP.

2.0 CONTROLS

If employees are subjected to noise levels that exceed any of the values shown on Table 3-1 or if employees are subjected to noise levels that are suspected to exceed any of the values shown on Table 3-1, engineering and/or administrative controls will be instituted in the work zone. If these controls fail to reduce worker exposure to the levels shown on Table 3-1, hearing protectors will be provided.

Hearing protectors will be made available to all employees exposed to the noise levels shown on Table 3-1 at no cost to the employees. The On-Site Project Safety Office (PSO) will ensure that hearing protectors are worn by employees who: (1) are subjected to noise levels in excess of the permissible limits shown in Table 3-1, or (2) are exposed to an 8-hour TWA of 85 dBA or greater and have experienced a standard threshold shift in hearing on an annual audiogram.

The remediation contractors will evaluate the effectiveness of hearing protectors in relation to the specific noise environment by checking the U.S. Environmental Protection Agency's Noise Reduction Rating shown on the packaging. The hearing protectors must be capable of reducing employee exposure to at least the values shown on Table 3-1. The adequacy of the hearing protectors will be reevaluated whenever employee noise exposures increase to ensure that the equipment can provide adequate protection. If necessary, more effective hearing protectors will be provided.

3.0 TRAINING PROGRAM

The hearing conservation training program (which will include any updated information) is provided on an annual basis for each employee who may work in areas with noise levels at or above any of the values shown on Table 3-1.

During this training program, employees are informed of:

- The effects of noise on hearing; and
- The purpose of hearing protectors; the advantages, disadvantages, and attenuation of various types; and instructions on selection, fitting, use, and care.

In addition, any informational materials pertaining to the Hearing Conservation Plan are made available to the affected employees.

4.0 AUDIOMETRIC TESTING PROGRAM

Field work contractors must establish and maintain an audiometric testing program that is available at no cost to all employees who perform fieldwork.

4.1 Baseline Audiogram

Within the first month of being hired, an employee eligible for fieldwork must take a baseline physical that includes a baseline audiogram. The baseline audiogram must be preceded by at least 14 hours without exposure to excessive workplace or non-occupational noise.

4.2 Annul Audiogram

After obtaining the baseline audiogram, a new audiogram for each employee expected to do field work should be obtained at least annually. Each employee's annual audiogram is compared to the baseline audiogram by a physician.

If the annual audiogram shows that an employee has suffered a standard threshold shift, a retest may be obtained within 30 days and consider the results of the retest as the annual audiogram. A physician will review any problem audiograms and determine whether there is a need for further evaluation by reviewing the following information as applicable:

- A copy of the requirements of hearing conservation
- The baseline and most recent audiogram of the employee to be evaluated,
- Measurements of background sound pressure levels in the audiometric test room, and
- Records of audiometer calibrations.

If differences between the annual and baseline audiograms indicate the occurrence of a standard threshold shift, the employee must be informed of this change in writing within 21 days. Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the following steps will be taken when a standard threshold shift occurs:

- Any employee who is not using a hearing protector shall be fitted with a hearing protector, trained in its use and care, and required to use it.

- If the employee is already using a hearing protector, he or she must be refitted and retrained in the use of a hearing protector and provided with a hearing protector offering greater attenuation, if necessary.

- If additional testing is necessary or if the physician who performed the evaluation suspects that a medical pathology of the ear is caused or aggravated by the use of hearing protectors, the employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate.

- If a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected, the employee must be informed of the need for an otological examination.

If the subsequent audiometric testing indicates that a standard threshold shift is not persistent, contractor:

- Will inform the employee of the new audiometric test results; and
- May discontinue the required use of hearing protectors for that employee.

4.3 Revised Baseline

An annual audiogram may be substituted for the baseline audiogram if the physician who is evaluating the audiogram finds that:

- The standard threshold shift revealed by the audiogram is persistent, or
- The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

5.0 RECORD KEEPING

The noise exposure measurement records will be retained for two years, and the audiometric test records will be kept for the duration of the affected employee's employment.

If requested, all of the required records will be provided to employees, former employees, and/or representatives designated by individual employees.

TABLE

Table 3-1

Permissible Noise Exposure Limits [1]
Hearing Conservation Program

Duration (Hours per Day)	Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

Key:

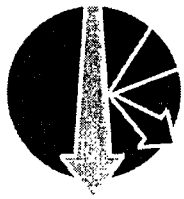
dBA = An abbreviation for decibels measured on the "A" scale of a standard sound level measuring instrument at slow response.

Note:

[1] When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered rather than the individual effect of each. In addition, any exposure to impulsive or impact noise should not exceed a peak level of 140 dBA.

APPENDIX C

Soil Erosion/Sediment Control and Pollution Prevention Plan



Slurry Systems INC.
THE DRIVING FORCE SM

SOIL EROSION/SEDIMENT CONTROL PLAN
AND
POLLUTION PREVENTION PLAN
VIBRATED BEAM SLURRY WALL

ENVIRO-CHEM CORPORATION
ZIONSVILLE, IN

PREPARED BY

SLURRY SYSTEMS INC. (SSI)

September 2005

1. INTRODUCTION

Slurry Systems Inc, (SSI) has developed this Soil Erosion/Sediment Control Plan and Pollution Prevention Plan for the installation of slurry walls using the Vibrated Beam Method. The purpose of this plan is to protect Unnamed Ditch and the area between Unnamed Ditch and the area of construction from pollution and/or erosion associated with the installation of the slurry wall.

2. EROSION CONTROL PLAN

SSI will minimize the potential impacts of erosion during construction activities by utilizing a berm and silt fencing. The excavated soils from the reservoir trench will be temporarily placed in a berm on the outside (western and southern) edge of the wall to prevent any potential migration of slurry outside the work area. A silt fence will be installed outside (down slope) the soil berm so as to prevent sediments from migrating down the slope which leads to Unnamed Ditch or to the engineered storm water diversion channels. Silt fencing will also be installed along the site diversion channels located adjacent to the slurry wall.

The silt fence will consist of Class 3 geotextile material woven from isostatic polypropylene monofilaments and will be non-biodegradable, and resistant to chemical degradation with a grab strength of at least 90 lbs. The silt fence posts will be spaced 8 feet center to center, or closer, and will extend at least 1 foot below grade. The filter fabric will be fastened to the silt fence posts at the top, center, and bottom with staples. The filter fabric and fence will be buried at least 4 inches below grade and will extend at least 2 feet above grade.

All soil erosion and sediment control measures will be inspected by SSI on a daily basis. In particular, the soil berm will be checked for damage or deterioration. Repairs will be made immediately upon discovery. Erosion control measures will be maintained until grass growth is established.

SSI's Site Supervisor, will be responsible for establishing and maintaining the berm and silt fence and, if necessary, for responding to and correcting problems with the erosion controls. If such an incident occurs, SSI will notify the Trust's Engineer immediately and will assess the problem and determine proper actions to be taken to remediate the impacted area. SSI personnel will receive site-specific training at project startup in all aspects of environmental and erosion control.

3. POLLUTION PREVENTION PLAN

The following are pollution hazard assessments associated with installation of a slurry wall using the Vibrated Beam Method:

1. **Mobilization** - Mobilization does not involve contact with any potentially hazardous substances.

2. **IMPERMIX® Slurry Mixing** - This operation involves mixing attapulgite clay and slag cement slurry to support the slurry wall operation. Mixing plant operations present potential exposure to dust during mixing operations. The clay and cement are inert materials. Consequently, they are not considered a potential hazard. All slurry material delivered to the site (i.e., clay and cement) will be contained in bags. Upon delivery, all bags will be inspected to check for tears or punctures in bags. Any bags found to have deficiencies will be used immediately, repaired, and/or removed from site to minimize spills and dust. All dust-producing products, such as clay and cement, will be placed directly in a mixing tank and immediately mixed with water to minimize airborne particles.

3. **IMPERMIX® Slurry Wall Production** – The vibrated beam production will generate little or no dust. The excavated soils from the reservoir trench will be temporarily bermed on the outside edge of the slurry wall to prevent any slurry spills outside the work area. These soils will be used to backfill the reservoir trench following the completion of the slurry wall.

4. **Demobilization** – SSI will perform general clean-up activities as part of demobilization.

Petroleum-based products will be used in or on heavy equipment. Equipment used on-site will be inspected for leaks and, if necessary, repaired to eliminate leakage of fuel or oil onto the ground. Diesel fuel will be stored in an American National Standards Institute (ANSI) approved storage tank, if required.

The following housekeeping practices will be used to reduce accidental exposure of construction materials substances to the air, water, or soil:

1. Only materials and products needed to complete the job will be stored on-site.

2. All products and materials will be kept in their original containers with manufacturer's original label.

3. Manufacturer's recommendations for proper use and disposal will be followed.

4. Original labels and material safety data sheets (MSDS) will be kept at the site.

5. No materials, wastes, effluent, trash, garbage, oil, grease, chemicals, etc., will be stored in areas adjacent to streams or other waterways.

6. There will be no open burning of waste materials generated during the project.

7. Water/slurry in the reservoir trench will be prevented from entering Unnamed Ditch and the site Diversion Channels.

APPENDIX D

Contractor Submittals

APPENDIX D

Contractor Submittals

1. Contractor Pre-Construction Submittal

The Contractor will be required to prepare a Contractor Pre-Construction Submittal. The following documents are to be included in the Contractor Pre-Construction Submittal:

- Construction Work Plan, which will include a figure showing the locations for the installation of silt fencing.
- Work Schedule.
- Contractor Site Specific Health and Safety Plan.
- Impermix® supplier, material specifications, and material certifications.
- Geotextile material specifications, and installation instructions.

2. Contractor Construction Submittals

The Contractor will be required to prepare Contractor Submittals during the construction activities. The following documents are to be included in the Contractor Construction Submittals:

- Laboratory Tests: Three copies shall be submitted no later than 24 hours after the results are received.

- Field Tests: Three copies shall be submitted no later than 72 hours after the field tests are performed.

- Trench Bottom Profiles: Three copies no later than 48 hours after the applicable work or inspection is completed.

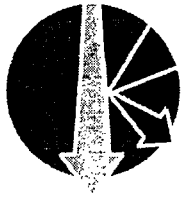
3. Contractor Post Construction Submittal

The Contractor will be required to prepare a Post Construction Submittal. The following document is to be included in the Post Construction Submittal:

- As-Built Details and Specifications

APPENDIX E

Quality Control Plan



Slurry Systems INC.
THE DRIVING FORCE SM

QUALITY CONTROL PLAN
FOR
VIBRATED BEAM SLURRY WALL

ENVIRO-CHEM CORPORATION
ZIONSVILLE, IN

PREPARED BY

SLURRY SYSTEMS INC. (SSI)

September 2005

I. QUALITY CONTROL (QC PLAN)

Organization. The President of SSI, Fred Schmednecht, P.E., is ultimately responsible for the quality of the work performed by our crews. The project engineer and/or manager in the office develops this QC Plan for the project using, at a minimum, the contract documents, specifications and industry standards. For this project, the project engineer and/or manager is Dana Wesolek, P.E. The project engineer and/or manager develops a plan that relies on accepted standards and reliable SSI methods to plan the implementation of the work. The project engineer and/or manager delegates the implementation of the plan and the responsibility for the quality of the work to the project and/or site superintendent.

The site supervisor, Mr. Mike Roberts, is assigned to the project and is charged with implementing the QC Plan and the performance of tests. The site supervisor has the authority to assign specific quality control tasks or inspections to responsible crew members as long as adequate supervision and review is enforced.

Mr. Mike Roberts has extensive experience with the installation of groundwater cut-off walls. The site supervisor will report directly to the project engineer/manager in the office and will have the authority to stop work in the field for any quality control issues. The project engineer/manager in the office has the responsibility to report any relative issues to the President of SSI.

The QC organization consists of the following positions which are listed according to lines of communication from field to office for QC control: Project/Site Supervisor to Project Engineer/Manager to President of SSI. Resumes of the mentioned personnel will be provided upon contract award.

Submittal Procedures. SSI will make submittals in accordance with the requirements of the contract. A submittal register will be used to schedule and track all submittals. The register will be updated as needed to ensure that it is current as submittals are made or returned. The register will allow SSI to ensure that submittals are properly scheduled to allow for review prior to ordering and/or acting.

All submittals will be checked and approved by one member of the QC organization prior to submittal. The submittals will be accompanied by a transmittal form, which is signed and dated. Any deviations will be clearly identified on the transmittal form in the remarks section.

Testing Procedures. Control, verification, and acceptance testing procedures for each specific test will include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. All tests will be performed in accordance with the plans and specifications. The applicable quality control tests will be performed, documented and submitted with the Daily Work Report.

The project consists of the installation of the cut-off wall and therefore the majority of quality control will be devoted to this item. This QC plan includes, but is not limited to, slurry testing and procedures to verify depth and plumbness. Test results, abnormalities, and sampling procedures will be recorded on the daily field reports.

Slurry Quality Control Testing And Equipment Procedures

1. Impermix® Slurry

IMPERMIX® used for the slurry wall will be tested in accordance with the parameters shown in the following table. The water for slurry preparation will be provided by ENVIRON, provided laboratory tests prove it meets quality standards for our slurry. Otherwise, potable water will be trucked in (extra charge). Test results will be recorded on the daily quality control report. The unit weight and viscosity test procedures are included as Attachment 1. Mixing plant record keeping shall include maintaining an accurate record of all slurry ingredients, including any additives used for slurry production, mixing time for each batch, and the volume of slurry produced for each batch.

Table 1: IMPERMIX® Slurry Properties

SUBJECT	STANDARD	TYPE OF TEST	MINIMUM TESTING FREQUENCY	SPECIFIED VALUE
IMPERMIX® - as mixed	API RP 13B	Density (lbs/ft^3) Viscosity, Marsh (seconds)	Every 20,000 gallons or twice daily (whichever is greater)	68 to 75 lbs/ft3 Greater than or equal to 35 seconds
Slurry-In Wall	Hydraulic conductivity	ASTM D 5084	every 300 LF of wall	Less than or equal to 1x10-7 cm/sec, after 60 days of setting

2. Trench Width, Depth, Continuity, Verticality, and Alignment

SSI will maintain a tight quality control program for the penetration of each beam. The width of the slurry wall will be verified by calculation. SSI shall compare the square foot production in relation to the volume of slurry produced to give an average wall thickness for that day. Continuity will be ensured by the overlap as described in the Cutoff Wall Construction section of the slurry wall Design and Installation procedures (submitted under separate cover). Wall verticality is maintained by two principles: (1) the beam is checked prior to each penetration

for verticality with a 4-foot hand level, and (2) the beam will take the path of least resistance as it penetrates the ground.

The depth of the slurry wall will be determined by the depth profile to be provided by the Trust's Engineer. The beam is marked every foot for easy identification of actual depth. The slurry wall alignment and offset control points will be surveyed.

Production records during driving of the vibrated beam shall include an accurate record of the total penetration depth of each beam drive, maximum depth of penetration of each beam, a record of the driving pressure, and changes in slurry pressure versus depth for each beam.

3. Laboratory Quality Control Testing

Laboratory testing for this slurry wall will be every 300 LF of installed wall, as described in Slurry Quality Control Testing And Equipment Procedures – Item 1. The laboratory will be off-site and pre-approved by the Trust's Engineer. Three samples will be taken at each location: one for SSI, one for Trust's Engineer, and back-up sample. SSI will store its samples and the back-up samples in a trailer located at the staging area prior to shipping to the lab. All samples will be labeled with the following information: EnviroChem Site, sample date, and sample station location. The test results will be submitted to Trust's Engineer on a daily basis upon our receipt from the lab.

4. On Site QC Equipment

The following equipment will be utilized for on-site quality control testing:

1. Mud balance for density testing.
2. Marsh funnel for slurry viscosity measurement.

Deficiency Procedure. The following procedure will be used for tracking construction deficiencies, from identification of the deficiency through acceptable corrective action.

This procedure shall establish verification that identified deficiencies have been corrected. Daily checks will be performed to assure that quality control activities are providing continued compliance with contractual requirements and shall be recorded on the Daily Work Report. Final follow-up checks shall be conducted at the completion of each work item and prior to start of additional phases that may be affected by any deficiencies in previous work.

A deficiency-tracking list for the entire project will be developed and a deficiency number associated with each problem will be assigned chronologically, starting with Deficiency #1. This list will be continually updated and posted in the on-site field trailer.

It will include, at a minimum, the following items: deficiency number, deficiency description, date of deficiency discovery, person responsible for discovering deficiency, description of corrective action and scheduled date for corrective action and final date corrected. A copy of this form will be submitted along with the Daily Work Report on any dates that it is determined that a deficiency has occurred or has been corrected.

Reporting Procedures. SSI shall keep detailed and accurate records of the mixing plant and vibrated beam production during installation of the slurry wall. The Daily Work Reports will be completed early the following morning for signature of Trust Engineer's on-site representative. SSI intends to use the following forms (provided upon request):

- Daily Work Report
- Daily Vibrated Beam Production
- Daily Batchplant Production
- Vibrated Beam Production Summary (not daily)
- Material Control (not daily)

Copies of these records shall be provided to the Trust's Engineer on a daily basis. Updated and current copies of all QA/QC documents will be available at the site trailer for review or inspection at all times.

II. CLEAN-UP

After the completion of the construction operations, all remaining material and slurry shall be removed from the ground surface in the construction area, including the mixing areas. The Trust Engineer's on-site representative shall be the judge of satisfactory clean-up and clean-up shall reasonably be performed until accepted.